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CONTAGIOUS MASTITIS OF COWS.

INVESTIGATIONS ON CURATIVE TREATMENT.

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DURING the past twelve months a number of experiments in regard to the curative treatment of contagious mastitis (or mammitis) have been conducted at this Laboratory. The results—some negative, others partially successful—may be of interest, and a brief account has therefore been written for the *Journal*. Before these particulars are recorded, however, it is important that the reader should be acquainted with some of the difficulties which have to be contended with in relation to the treatment of this disease.

In previous experiments undertaken some years ago in regard to treatment by means of bacterial vaccines, milch-goats, for the sake of convenience and economy, were utilized. It was decided to employ these animals again, after having artificially infected them with pure cultures of the *Streptococcus mastiditis*, the specific organism of the disease. Unfortunately, during the course of these experiments, the subjects became affected with parasitic gastritis. It was recognized that it is erroneous to draw comparisons between the response to treatment of contagious mastitis in artificially infected goats and naturally infected cows. Therefore, whenever the opportunity arose,

cows in the neighbourhood of the Laboratory which were found to be suffering from this complaint have been obtained for experimental treatment. This arrangement proved of mutual advantage, since the owner was relieved of the danger of retaining a potential centre of infection in his herd, and, in addition, had the affected animal treated free of charge. In return, we have been furnished with material for our inquiry.

One of the chief obstacles in securing suitable cases for this work is the difficulty experienced in obtaining subjects in the early stages of infection. Streptococcic mastitis, which is the only form of the disease with which we are at present concerned, is very often insidious in its onset, and not noticeable in the early stages. Its tendency is soon to pass to the chronic stage, denoted by the formation of inflammatory fibrous tissue in the teat or quarter of the gland attacked. Following the general rule in all diseases, the earlier treatment can be undertaken the more effective are likely to be the results. The older the infection the more remote become the chances of eventual recovery, and the less hopeful any form of treatment employed.

In our earlier work on this subject, carried out in 1913–14, with bacterial vaccines prepared from killed cultures of the specific organism it became evident that this line of treatment was unavailing once abscesses had formed in the gland, and that the disease was liable to be rendered worse if the inoculations were continued under these conditions. In the human subject under similar circumstances the practice is to open and drain the abscess cavity, but surgical interference with the cow's udder is, as a rule, interdicted on account of the liability to inflict permanent damage upon the quarter and to restrict its future function; nevertheless, surgical treatment has to be undertaken in some cases.

The methods of treatment likely to be successful are therefore limited to medication of the udder, either by the injection of germicidal solutions or the internal administration of drugs possessing antiseptic properties. In the latter case the treatment is based upon the hope that such drugs, when excreted with the milk, exert during their passage a germicidal effect upon the invading organisms. Another form of treatment which has found favour in the hands of some medical practitioners in regard to certain infections of a suppurative character consists in the injection of albuminous substances into the blood-stream. This treatment has been employed following the suggestion made that some of the effects of vaccines and serums were due to their albuminous content as distinguished from specific factors. Such substances as peptone, horse serum, nucleinate of soda, &c., have been used in this capacity. More recently (1920) milk has been used with fairly satisfactory results, notably by Trossarello, an Italian practitioner, for the treatment of gonorrhœa in the human subject.

Adverting to the first of these methods mentioned—*e.g.*, the injection of antiseptics into the udder—the limitations placed upon this form of treatment are severe in the case of the cow on account of the dependent position of the mammary gland, which facilitates the draining by gravitation of any liquids introduced up the teat-canal into the milk-sinus at the base of the teat, and renders systematic douching of the gland substance proper impracticable. Moreover, the

ramifications of the secretory system of the udder make it impossible for fluids to permeate to the more remote portions of the gland, where, probably, infection exists. When abscesses form in the quarter, these rapidly become enveloped by a fibrous capsule shutting them off from access from the surrounding fluids—blood, lymph, or substances introduced into the udder.

The fallacy of trying to check bacterial growth by the introduction of antiseptics into the udder has been pointed out in earlier publications (Report of Department of Agriculture, 1908, p. 207). The destructive action of antiseptics is directed rather against the body-cells than against the invading organism, and, since recovery in all diseases ultimately depends upon the bodily defences, this is precisely a state of things we would wish to avoid. Since the publication referred to this statement has required some modification. More recently, largely owing to the exigencies arising in connection with the treatment of wounded during the Great War, considerable attention has been devoted to the preparation of antiseptics which, while possessing high germicidal properties, are nevertheless comparatively innocuous to the body-tissues with which they come in contact. Such preparations, known as the chloramine series, and certain dyes, such as brilliant green, proflavine, and acriflavine, also some of the salts of heavy metals prepared in colloidal form, are more or less free from the objectionable features which characterized many of the antiseptics formerly used for these purposes. In the experiments about to be related advantage has been taken of these discoveries, and, where practicable, they have been applied to the treatment of contagious mastitis.

TREATMENT BY INTERNAL MEDICATION WITH FORMALIN.

Within recent years (1917–20) considerable success has been claimed in America and elsewhere in the treatment of streptococcic mastitis by the administration of formalin in solution. Formalin consists of a concentrated (40-per-cent.) solution of formaldehyde gas in water. It is stated that when doses of this solution are given by the mouth the formalin is excreted with the milk and acts as an udder-disinfectant. Doses of 1 to 2 drams of formalin in half a pint of raw linseed-oil are given two or three times a day, combined with general treatment, such as suspensory bandage and wet packs, to the inflamed udder, frequent milking, &c.

We have tried the effect of this treatment in suitable doses on infected goats and cows. In the case of the smaller animals the treatment, even with restricted and well-diluted doses, is not unattended by danger. The irritating vapour of the formalin frequently causes the animal to cough during the dosage, necessitating the sacrifice of the dose by releasing the animal's head, or, alternatively, the accidental entry of the solution into the lungs by way of the windpipe, with almost certainly fatal results. In cows this danger is far less appreciable. These animals may be safely drenched with formalin, provided due care is taken in its administration.

Unfortunately, we have been unable to distinguish any beneficial effects following the method, as checked by clinical observation of the case and naked-eye and microscopic appearances of the secretion

from the affected quarter. No harmful effects appeared to follow the treatment. In view of the disappointing results we have not pursued further this line of inquiry.

INOCULATION OF ALBUMINOUS SUBSTANCES.

Following the method previously alluded to, milk was chosen for these experiments, which were carried out on a more extensive scale and over a long period upon both infected cows and goats. This was done because the method, if of any value, would prove a highly practical one. Doses of sterilized milk, varying from approximately 3 drams in the case of goats up to 1½ ounces for cows, were inoculated into the muscular tissue at periods of three days. With goats treated in the early stages by this means we were inclined to attribute good results, but once a chronic stage had been reached the method proved quite unreliable. Our experience with cows did not justify our expectations, and we are unable to speak with any confidence on the method.

INTRAMUSCULAR INOCULATION OF COLLOIDAL METALS.

The salts of certain metals have been prepared in a form which reduces the metal to an extremely fine state of division, and in which it can be held in solution. On the introduction of metals in this colloidal form into the blood-stream of an infected patient an electrical neutralization of the oxygen necessary for the maintenance of life of the parasite is said to take place by a process of oxidation and reduction. This method has yielded very beneficial results in respect to certain infective diseases of the human subject due to staphylococci and streptococci. For these a preparation known as "trimine" (colloidal manganese) has been employed. In the more chronic infective processes a preparation of an amino-compound of sulphur ("intramine") has also been successfully used.

Both these preparations have been tried by us in the treatment of acute and chronic forms of contagious mastitis, but the results obtained do not encourage the continuance of experiments in this direction.

INTRODUCTION OF ANTISEPTIC SOLUTIONS INTO THE UDDER BY WAY OF THE TEAT-CANAL.

Various antiseptics have in the past been tried in an attempt to disinfect the udder. Of these probably a saturated solution of boracic acid has been the most popular. We are unable to speak in favour of this method owing to the disadvantages already alluded to in discussing this form of treatment and the comparatively low germicidal power possessed by boracic acid. The only point in favour of this practice is the fact that udder injections lessen milk-secretion and hasten the "drying-off" process, thus suppressing a possible centre of infection.

Recently we have experimented with one of the newer dye preparations, acriflavine. This substance has the virtue of being relatively harmless to the tissues and body-cells, while possessing considerable germicidal properties. Solutions of 1–1,000 acriflavine are fatal to streptococci, and the dye has the power of penetrating the surrounding tissues to a considerable depth. Its germicidal action is apparently enhanced by admixture with serum, though in the presence of pus this property is diminished, thus lowering its value in the treatment

of chronic mastitis attended by suppuration. Cases treated with solution of acriflavine showed little improvement, though the milk-secretion and udder-tissues were stained a bright yellow by the dye for some considerable time after the injection. It is probable that, in common with other antiseptic solutions used in this way, acriflavine fails to reach certain centres of infection within the gland.

ETHERIZATION OF THE UDDER.

This method consists of the introduction of ether into the udder by way of the teat-canal. It appears to have been successfully employed by Dr. A. T. Peters, of Peoria, Illinois, who has recorded his results in the *Vitamineral News*, a publication we have not yet had the opportunity to peruse. The technique is simple. The apparatus consists of a flask or receptacle holding about 1 oz. of ether, and fitted with a rubber tube carrying an ordinary teat-siphon. The teat-siphon, after previous sterilization, is introduced up the teat of the affected quarter, and the receptacle is plunged into hot water. The ether soon vaporizes, and the vapour penetrates into the quarter, being further assisted by the natural heat of the body. When the ether in the flask is exhausted the siphon is withdrawn, the end of the teat held, and the quarter gently massaged so as to circulate the vapour.

Our limited experience with the results accruing from this form of treatment makes us regard the method hopefully. Twenty-four hours after the first injection the streptococci in the udder secretion have degenerated, as indicated by their appearance on microscopic examination and the loss of their normal staining affinities. In some cases streptococci disappear from the milk-secretion forty-eight hours later. In one case which came under our observation a single injection of ether was followed by the disappearance of streptococci from the milk in twenty-four hours. Pus cells and leucocytes remained in the secretion, but this slowly returned to normal within the following three weeks.

In common with udder injections generally, drying off of the quarter is likely to result after etherization. But the suppression of the streptococci is a very hopeful feature. If cessation of secretion can be brought about before a chronic stage of the disease has been reached recovery without damage to the quarter is possible, giving the animal a fair chance of coming in with a sound quarter the following season. As opportunities arise, further experiments in this direction will be undertaken, in order to ascertain whether the treatment is one that can be confidently recommended.

GENERAL.

Needless to state, in addition to the udder injections the patient must receive local and general treatment. This comprises attention to the general well-being, relief of painful inflammatory symptoms by hot fomentations to the udder, followed by massage with sedative liniment, application of wet packs and suspensory bandage in certain cases, and saline laxatives internally.

Those concerned with the important subject of contagious mastitis may rest assured that no method promising any success is being neglected in our efforts to find a means of combating this economically serious disease.

THE GRASSLANDS OF NEW ZEALAND.

PRINCIPLES OF PASTURE ESTABLISHMENT.

(Continued.)

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Peat-swamp Lands.

AREAS that have been swamp for very long periods of time are the habitat of coarse reed-like vegetation such as rushes (Fig. 26), raupo, &c., intermingled often with huge cushion-like masses of sphagnum moss. The decay of this growth has built up, at times to enormous depths, a loose peaty fabric which is saturated with water. When the water is drained off there remains a "soil" whose physical conditions are exactly the opposite to those which preceded the drainage. Drained peat swamps are essentially loose and dry, and methods for grassing them must be along lines of consolidation of and water-retention in the surface soil. In certain swamps there is soil of a very good quality; these generally are of a less peaty nature, and therefore much more readily consolidated after drainage. Just what class of peat swamp one has to deal with is very definitely proved by the class of vegetation that follows on the drainage of the area. Two distinct classes of vegetation arise: (1) Phormium ("flax"), niggerhead, Mariscus, &c., and (2) manuka and bracken-fern (Fig. 27). That class of peat swamp which reverts to phormium, niggerhead, &c., is of a decidedly superior quality to the other type, and, once consolidation has taken place, grassing should be along the lines suggested in the January issue for the better-class swamp lands. The latter type represents really what are known as true peat swamps, and the grassing of this type is quite a different proposition from that of the other. There is not the same body in the soil; the great tendency to dry out in the summer makes the use of shallow-rooting plants of no avail, and until such time as consolidation has taken place to allow of water-conduction from below it is simply courting failure to sow the ordinary pasture-plants.

The fundamental principle underlying the upward movement of water in soils is that the particles of soil be so placed together that the thinnest possible film of water may in a continuous system be maintained around each individual particle. The thinner the film the greater is its drawing-power from below, but just so soon as the particles become too widely spaced for a continuous film to be maintained water ceases to flow from below and the soil becomes "dry." For this reason these peat soils are unretentive of soil-moisture, for the particles are far too widely spaced to admit of the continuous film being maintained, and it is not until the particles have been packed closer together, or, in other words, until consolidation has taken place, that the transfer of water from below to the surface soil is possible. Theoretically there are many ways by which consolidation may be effected; practically there is only one economic way, and that is by the tramping of stock. By the tread of an animal great pressure is brought to bear on a small area at a time, and the method, although slow where but a few beasts can be maintained, is most effective. Another consideration is that it costs practically nothing.

FIG. 26. NATURAL VEGETATION ON A RAW PEAT SWAMP. THE AREA HAS BEEN DRAINED, AND ODD MANUKA-PLANTS ARE ESTABLISHED.

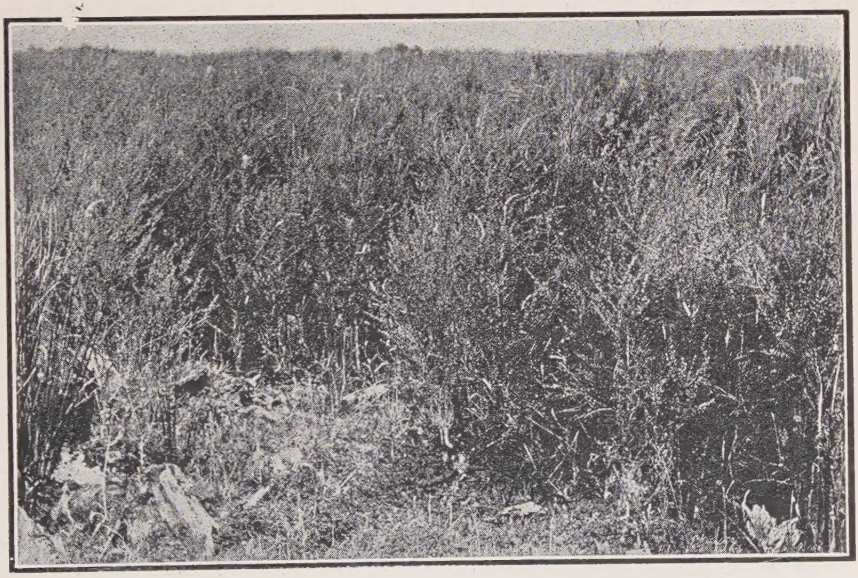

FIG. 27. MANUKA SUCCESSION FOLLOWING ON DRAINAGE OF AREA AND BURNING OFF OF THE RUSH COVER.

In the initial state of peat-swamp reclamation undoubtedly drainage is the prime necessity, and any remarks made in these notes presupposes that the swamps are in a drained condition. Large drains must of necessity be dug in order to get drawing-power, and it would appear when the area is finally drained that an overdrained state of the greater portion has resulted, but this apparently is quite impossible to avoid. Consequently, in a drained swamp there results, during the summer period at least, an extremely dry soil—so dry, in fact, that the peat fires with amazing ease, often to a considerable depth (Fig. 28). This firing of the swamp is one of the great dangers to be avoided, particularly in the early stages of peat-swamp reclamation or if the swamp has no great depth of peat. With a bad fire huge stumps are often exposed, and there frequently results so great a lowering of the soil-surface that wet-swamp conditions once more persist. It has been before stated that an overdrained state of the swamp is finally reached, and if consolidation by treading has not been attained by the method recommended later, then it would appear a feasible practice to burn the peat so that the surface to be sown is brought nearer to the water-table. But this burning would not be necessary nor advisable if consolidation and grassing kept pace with drainage.

Of the plants (with the exception of manuka and bracken-fern) to come in on these raw peat soils sorrel (*Rumex Acetosella*) is one of the first. Here is a plant with a root-system capable of rapid extension through the loose peat. Its rootstock, being fairly deep down, does not so rapidly suffer when dry conditions prevail, and, consequently, it is able to tide over these periods and to come away rapidly as soon as rain falls. A plant with such a root-system is essential for initial work. Among our pasture-plants there are several which have an underground root-system, but Lotus major stands out unequalled in this respect, and, as one would expect, this plant has demonstrated its ability to establish and to persist on the raw unconsolidated peat swamps. It establishes firstly only in the hollows and small consolidated portions (Fig. 29), and with these as centres it ramifies by its creeping underground root-system throughout the neighbouring loose peat (Fig. 30). It provides a certain amount of feed, sufficient, in fact, to induce stock on to the area. By their treading they consolidate more small areas, into which Lotus major spreads by means of its free-seeding attribute, and a fresh centre of root-spread is afforded. With further growth more and more consolidation by stocking is brought about, and a time soon arrives when the entire surface is covered (Fig. 31), and when plants other than Lotus major may be established.

Of grasses, one of the most successful, where the climate is sufficiently warm, is paspalum, which, in virtue of its enormous, deep root-system, once it is established, is able to withstand the driest weather. Unfortunately, the farmer is afraid of paspalum on this class of land, and it is banned in favour of other much inferior grasses. Attempts to establish the ordinary permanent English grasses on the loose unconsolidated peat swamp are doomed to failure. A mass of sorrel will result (Fig. 32), or there will be replacement by such grasses as Yorkshire fog and red-top. These two grasses are inferior to paspalum where the climate is sufficiently warm for this latter grass to thrive, but as pioneer grasses in the initial breaking-in they must

FIG. 28. PEAT SWAMP WHERE THE MANUKA HAS BEEN CLEARED AND BURNT OFF.

Note the gulleying of the area where the peat has been fired. To the right of photo the peat has burnt to the water-table. Photographed in month of February.

FIG. 29. LOOSE PEAT SWAMP, SHOWING SMALL CONSOLIDATED AREAS READY FOR THE RECEPTION OF LOTUS MAJOR SEED.

FIG. 30. SECTION OF PEAT SWAMP, SHOWING THREE FOOTPRINTS (INDICATED BY WHITE CROSSES) IN TWO OF WHICH LOTUS MAJOR IS ESTABLISHED.

The Lotus major is in full seed, and this seed will establish in any further consolidated areas that may be made by the stock grazing on the plant.

FIG 31. LOTUS MAJOR ON RAW PEAT SWAMP THREE YEARS AFTER THE ORIGINAL SURFACE-SOWING.

The associated grass is Yorkshire fog.

on no account be despised. If paspalum is not used there is more hope of success in using these grasses in conjunction with the Lotus major than in using the more highly classed English grasses (Fig. 33). Yorkshire fog and red-top can tolerate extremely wet conditions, yet they are imbued with certain xerophytic or drought-resistant characters which enable them to tide over the extremely dry summer conditions common to peat swamps. This dual character is of extreme importance, and the possession of such by a grass or clover must place that plant in the foremost rank of pioneers for peat-swamp reclamation. Such plants may not be of such highly nutritive quality nor yet so palatable as the better English grasses and clovers, yet by their use consolidation is accomplished, and the ground thus prepared for the reception of these better grasses in later years.

By the decay of herbage, by the droppings of stock, and by the pounding of the peat by their feet the peat is reduced to a more solid soil-like consistency fit for the reception of almost any pasture or forage plant.

On swamp lands that can be ploughed and a seed-bed prepared the procedure for the establishment of a truly permanent pasture may be considerably modified. On the prepared surface quickly establishing and rapid-growing plants are employed—Western Wolths rye-grass or Italian rye-grass and red clover are the main species used. These are sown at the most opportune times to ensure successful establishment —in the autumn or early spring—and the rapid growth these species make not only crowds out sorrel, &c., but ensures the carrying on that area of a large number of stock, and hence consolidation by their treading. In peat-consolidation one of the principles is avoidance, as far as possible, of ploughing, and hence it is good practice to prolong as long as possible the life of the temporary rye-grass and clover pasture that has been sown. Hay containing ripe clover-seed can be fed out on these pastures in the winter, together with roots, and not only is consolidation effected by this means, but a liberal seeding of clover-seed is made which germinates and extends the life of the pasture (Fig. 34). By the use of the chain harrow and surface sowing of grass and clover seed it is often possible to establish a permanent pasture without further recourse to ploughing.

It will be obvious, of course, that one commencing with only peat swamp will not in the initial stages be able to grow hay for the purpose of feeding out. The temporary-pasture method is then of not much avail, and more reliance must be placed on getting in the deep-rooted plants previously mentioned. If paspalum is used, however, care should be taken that the area sown is sufficiently level to allow of mowing. This is very important in paspalum-farming.* Having a certain area in paspalum, Lotus major, &c., that can be hayed, the farmer can then break in more land by means of the temporary-pasture method, the paspalum hay cut from the already established area being used to maintain the stock during the winter on the newly sown portions. Paspalum and clover seed will be shed on the ground, and these will germinate and take up the running as the more temporary elements die out. The temporary pasture itself also functions.

* An article dealing with the farming of paspalum will appear in due course.

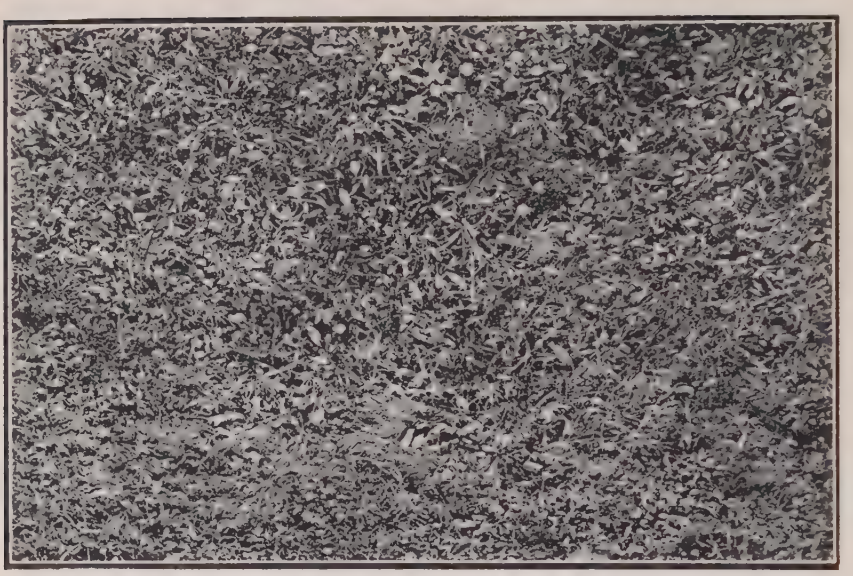

FIG. 32. ILLUSTRATING AN ATTEMPT TO ESTABLISH PERMANENT PASTURE ON PEAT SWAMP WITHOUT REGARD TO PREPARATORY CONSOLIDATION. PASTURE THREE YEARS OLD—PRACTICALLY A MASS OF SORREL.

FIG. 33. PEAT-SWAMP AREA WHERE YORKSHIRE FOG IS PLAYING AN IMPORTANT PART AS PIONEER.

This area was originally sown with a first-class English grass-mixture. Pasture three years old; scarcely any of the sown species are now left.

FIG. 34. SOWN TEMPORARY PASTURE ON SWAMP AREA, ON WHICH HAY CONTAINING WHITE-CLOVER SEED HAS BEEN WINTER-FED.

Consolidation is preserved, and almost any grass or clover species could be introduced by this method.

FIG. 35. PEAT-SWAMP AREA WHERE THE MANUKA HAS BEEN FELLED BUT NOT BURNT OFF. LOTUS MAJOR IS WELL ESTABLISHED THROUGHOUT THIS COVER.

Establishment here is more certain than on the burnt-off surface shown in Fig. 30, where establishment will take place only in the small depressed areas.

well as a hay crop, but it must be borne in mind that while the hay crop is being produced no consolidation of that field is possible, and, consequently, as progress towards permanent-pasture establishment depends on the amount of consolidation effected, advance along these lines is slow.

Establishment on loose open soils, such as the raw peat swamps, is often possible if some cover strewn over the surface can be provided. Thus where manuka has been cleared, if it is allowed to rot on the ground, establishment among it of Lotus major, paspalum, &c., is more

FIG. 36. PAKIHI AREA ON THE WEST COAST OF SOUTH ISLAND. SHOWING ASSOCIATION OF SPHAGNUM, RUSHES, AND MANUKA PREVIOUS TO DRAINAGE.

certain than if the manuka is burnt off leaving only the ash behind (Figs. 30 and 35). This is a principle applicable to almost all those soils where a loose, easily-dried-out surface is exposed on burning. The least bit of cover provides shelter, and keeps the surface layer of soil cool and damp; it is the rapid drying-out of the surface layer that leads to the high death-rate in our seedling plants.

Just what the final permanent-pasture sward will consist of on the peat-swamp soils depends a good deal on location and the extent to which the area has been drained. Paspalum is bound to play an important part in peat swamps of the Auckland District, but of grasses other than this, cocksfoot, crested dogstail, and timothy, together with Lotus major and white clover, will form the main constituents in the pasture of the drier soils. It would appear that overdrainage is a danger of many peat-swamp soils, particularly so of the heavier class, which normally under optimum draining would carry a pasture of the

meadow-foxtail, Poa trivialis, timothy, and clover type, and this sward is undoubtedly superior to the cocksfoot, crested dogstail, timothy, and clover type previously mentioned. This question of overdrainage, however, is one requiring further investigation, but it is a point one should have in mind when farming this class of country.

Pakihi Lands.

The pakihis (which occur chiefly on the north-west coast of the South Island) are swamp lands not so much from their low-lying condition as from the fact that at varying distances below the surface lies a hard-pan that is impermeable to water. Consequently in a climate where rainfall is heavy the upper layers of soil become exceedingly waterlogged, the movement of such water is very slow, and stagnant conditions may prevail. There are very few plants of economic use that will tolerate stagnant conditions, and until these soils are opened up and sweetened by drainage there is little likelihood of successfully grassing them. In most cases the surface layer is peaty, and sphagnum moss is common (Fig. 36). When drained, therefore, consolidation must be effected, and the general principles already outlined for peat swamps will also apply to pakihi lands.

SELECTION OF SEED MAIZE.

PRACTICAL POINTS FOR GROWERS.

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Maize may be easily improved by the farmer in one of two ways: (1) By the selection of the best ears for seed from the best stalks in the field, or (2) by selecting the best ears from the best row in a field, each row of which has been planted with seed from a single ear. For the efficient carrying-out of such selection it is, of course, necessary to know what kind of ears to choose for seed. To do this the most important points should be fixed in the mind. Each ear is examined and compared with the points for a perfect ear which is considered the standard.

It is a popular misconception among growers that it is beneficial to obtain their seed from another district. On the contrary, the effect of acclimatization on the yield of maize is so marked that a grower should always use his own seed, or, at least, seed grown in the same district by another reputable grower. By careful selection of seed each year the yield can not only be maintained but greatly increased.

The best time to select the seed is just at maturity, and from the standing crop. If selection is made from the crib, only the size and shape of the ears can be considered, and there is then no way of telling whether the best-looking ears have come from prolific plants or not,

or whether they owe their superior characters to better conditions of soil and moisture. The kind of plant from which seed should be taken is one that, without any apparent reason, produces much better than plants surrounding it. To obtain uniformity of ripening, ears should be selected from plants that ripen at approximately the same time. The plants should be well rooted, of medium height, strong, and with ears about 4 ft. from the ground.

The points of an ideal ear may be stated as follows :—

(1.) Trueness to type or breed : The maize should conform to the standard for the type and breed in form of kernel, shape of ear, and indentations and colour of grain.

A UNIFORM LOT OF MAIZE.

The ears are similar in shape and size, and show no marked irregularity in colour, form, or indentation of kernels.

VARIOUS SHAPES OF EAR.

The ear on left is too short and thick, although good in other respects; the second is a desirable ear; the third has an enlarged butt and irregular rows; the fourth, on right, is too slender.

(2.) Shape of ear: The ear should be cylindrical, and not crooked nor too tapering. It is as difficult to find an ear of maize perfect in shape as it is to find cows, horses, or sheep with perfect forms. The shape of ears of the different varieties of maize vary as widely as the shape and form of the different pure breeds of cattle. Each class and variety has a characteristic shape peculiar to itself. The most desirably shaped ear is cylindrical from butt to tip. Where ears are inclined to taper it will be noticed that, as a rule, two or four rows are dropped near the middle of the ear.

(3.) Colour of grain and cob: The colour of the grain should be uniform, and free from missing or discoloured kernels. The colour of the cob should be a bright cherry-red for yellow maize and pure-white for white maize. A bright cherry-red denotes health and vigour, and a pale or dark-red cob lack of constitution. It is to be remembered that colour of grain makes no difference in respect to feeding-value, and it is merely a matter of taste to the grower as to the colour of maize he desires.

TIPS AND BUTTS.

The first three tips (left to right) are undesirable, while the fourth is almost perfect. The first has a bare cob, the second is double tipped, and the third too pointed—all features to be avoided.

At left of bottom row is a well-formed butt, the next is too contracted, the third too flat, while that at the right is badly formed and poorly filled out.

(4.) Tips and butts: The kernels should extend over the tips and butts in regular rows, be well developed, and be uniform in shape and size. A perfect tip has a central kernel called the cap, which is completely surrounded with uniform kernels. If bare tips are noticeable to any great extent throughout the field it may be due to the fact that the silks representing the tip kernels, which were formed last, were too late to receive the pollen to fertilize them, or that seed of mixed variety has been sown. If ears having a defective tip are used for seed their undesirable characters will soon become permanent. Open tips usually accompany shallow and irregular kernels on the ear, which make the kernels on that part of the ear undesirable for planting on account of lack of uniformity. The butt and tip kernels are rejected for planting because they are more likely to be mixed with other varieties, and because, owing to their peculiar round formation, they are not uniform and interfere with planting. Further, fully developed tips cause the cob to turn down when ripening and prevent water from lodging.

(5.) Kernels: These should be wedge-shaped and uniform in size, shape, and colour. A plump tip in a kernel indicates vitality. Cobs with irregular kernels, or kernels with weak or shrivelled tips, should be discarded, no matter how well the outside of the ear may look.

(6.) Length and circumference of ear: A perfect cob should be about 10 in. long, and the circumference three-quarters of the length.

(7.) Spaces between rows and kernels: Furrows between rows should be straight, with uniform spaces between kernels at the crown. No space should be noticeable at the tips near where they are attached to the cob. Straight rows are the most desirable, as they give a uniform appearance to the ear and admit of the kernels being placed in a more exact position. The furrow should not descend to any great depth, but merely mark the dividing-line between the kernels from butt to tip.

(8.) Proportion of grain to cob: Good, well-matured maize should show a ratio of from 85 to 87 per cent. of grain to cob. One should choose a cob with from 16 to 20 rows of kernels of medium depth. If the size of the cob is reduced the ear simply drops its rows by pairs until there are but 10 to 12 remaining.

Having selected the maize in the field, after examining the ears thoroughly, each selected ear should be marked with white paint. When picked these ears are placed in a separate receptacle in the wagon, and then strung up on wires in the shed in a position where they will not touch each other and where there is a good circulation of air.

About sixteen good cobs will provide sufficient seed to sow an acre, so that for the little trouble spent in selecting good seed the grower will be amply repaid in the following year by the increased returns.

EXPORT OF APPLES.

EXPERIMENT IN BEST MATURITY STAGE FOR SHIPMENT.

Horticulture Division.

REALIZING the value of data in regard to the carrying of fruit to the world's markets, and following up the handling and cool-storage tests which had been carried out in the Hawke's Bay District,* an experiment was conducted by the Horticulture Division in connection with the export shipments during last season. The object in view was to ascertain the best stage of maturity at which to pick apples for successful shipment in cool chamber, observations in this case being taken on arrival of the fruit at its destination (London) by Mr. G. Stratford. The varieties of apples used were Cox's Orange Pippin, Dunn's (Monroe's Favourite), and Jonathan, all of which were procured and packed in the Hawke's Bay District.

COX'S ORANGE PIPPIN.

By the "Hororata" five cases of Cox's Orange were shipped, each case containing fruit in different stages of maturity, described as follows:—

* For reports on these tests see *Journal* for January, 1920 and 1921.

Case No. 1: Represented fruit with 10 per cent. colour, dull red, not very pronounced, poor appearance; bright leaf-green background, slight yellow here and there. Traces of russet were scattered within limits of "Fancy" grade.

No. 2: Fruit with 25 to 30 per cent. dull-red colour, pronounced but not attractive; bright leaf-green background. Russet within limits of "Fancy."

No. 3: Under 10 per cent. dull-red colour, not attractive; light-yellow ground with traces green showing.

No. 4: 25 per cent. upwards of colour, bright and well-pronounced; good contrast with ground colour of light yellow. Traces of russet.

No. 5: 25 per cent. and upwards of bright and distinct colour; advanced yellow background. At highest stage of development.

The fruit was picked on 18th and 19th February, when the weather was dull and dry, and packed and sent to Wellington, leaving by the "Hororata" for London on 22nd March. Unfortunately, the majority of the Cox's Orange lots by this boat arrived in more or less wasty condition; consequently it was difficult to come to any satisfactory conclusions. The following reports were received on each case after inspection in London, every apple having been carefully examined:—

Case No. 1: Dull yellow, with practically no colour showing. Inclined to shrivel. Fruit bruised. Bitter-pit showing in many fruits. No rots. Rather immature for shipping purposes, the market preferring Cox's Orange with a certain amount of blush. Small amount of russet was of no consequence.

No. 2: The fruit in this case was bruised very badly. Apples more or less striped on a very yellow background. No shrivelling. Fruit badly scalded. Colour better than in case 1, but did not open up as well. Russeting nothing.

No. 3: Fruit bright yellow; not as good colour as case 2; just about the same as case 1. Little scald. Flavour more pronounced than in other cases. Quite a number of rots. Fruit too large for variety. Bitter-pit on many.

No. 4: Very good colour indeed. Heavier background than 1, 2, or 3. Not such bright yellow, but the good blush with greener background made good contrast and more in appearance with English Cox's Orange. Fruits too large. Scald bad. Type merchants like on market here if slightly smaller. Appears to represent the right stage of maturity. Undoubtedly best of the five cases sent.

No. 5: Colour very good. Background more advanced than 4. High percentage of rots. Fruit very bruised. Apples appeared as if overmature when shipped—colour at expense of maturity. Fruit not as juicy as 3 or 4. Bitter-pit on many fruits. Not nearly as good as 4, but probably a little better than 3.

Summary: None of the cases arrived in very good order, having suffered the same as the bulk of the shipment, owing to the various causes which prolonged the voyage. As stated, case 4 would represent the right stage of maturity at which to pick and pack for export. The fruit, however, was slightly on the large size for the English market. The best Cox's Orange Pippin to send are those with a fairly good blush, the ground colour just turning from green to yellow, but not too far advanced.

DUNN'S.

By the "Athenic," which sailed from Wellington on the 15th April, 1921, four cases of Dunn's were shipped. Different stages of maturity were again selected, and noted as follows:—

Case No. 1: Traces of blush; dull green. Traces of russet. Low pack.

No. 2: Traces of good colour; light yellow with traces of leaf-green. Traces of russet.

No. 3: 25 per cent. upwards of colour, very bright and distinct. Pronounced yellow with no trace of leaf-green. Very attractive. Russet trace.

No. 4: Mixed blush colour; good colour mixed. Russet scattered and confluent.

The reports received from London on their arrival were as follows:—

Case No. 1: Apples were just turning yellow with a very slight blush. In very good condition. Firm; no bruising. Packing not too low—in fact, just about right. Gross weight only 39 lb.; serious breach on this market.

No. 2: Fruit in this case larger than in case 1. No bruising. Fruit very clean, nice and showy, with good yellow background and fine blush. Very nice case. Better than 1, and opened up better. Dunn's shipped at this stage of maturity would be well received.

No. 3: This case was very nice indeed. Just about right stage of maturity to ship at. Slight bruises on a few fruits. Apples just about right size for variety—$2\frac{5}{8}$ in., $2\frac{3}{4}$ in.; 41 lb. gross. Undoubtedly the best case of Dunn's shipped. Blush was very nice and distinct, with deep-yellow background. Fruit held up for long time in good condition. Dunn's shipped as this case would always do well on this market.

No. 4: Fruit very bruised in this case; packed too tight. Slight blush on greenish-yellow background. Not to be compared with 3. Unattractive appearance. More russet than in most cases.

Summary: All the cases of Dunn's arrived in firm condition. Case No. 3 stood out by itself for best condition, and would appear to indicate the correct stage of maturity for picking. On the whole, all of the cases were good. The amount of russeting (which was kept within the requirements of "Fancy" grade) would be taken no notice of by London buyers, with the exception of case 4, which contained rather too much russet (although within the limit), and this should be avoided.

JONATHAN.

Seven cases of Jonathan were also shipped by the "Athenic," the different stages of maturity being described as follows:—

Case No. 1: Colour under "Fancy"; dull red; dull-green background with slight traces yellow. Russet traces.

No. 2: Over "Fancy" colour, but dull; dull-green background. Traces of yellow and russet.

No. 3: Colour under "Fancy"; light red; more advanced; light-yellow ground. Traces russet.

No. 4: Colour over "Fancy"; light red; yellow with traces of leaf-green.

No. 5: Bright, good colour; up to "Fancy"; light-yellow ground. Traces russet. Advanced stage of development.

No. 6: "Fancy" colour; good and bright; light yellow. Considerable amount of russeting.

No. 7: Well advanced to ripeness. Advanced yellow. Refused for export.

The following are the reports received from London on the condition of these apples on arrival:—

Case No. 1: Fruit dull; very little colour. Carried well, but looked poor when compared with more advanced fruits. Not recommended to ship at this stage; too green, and too much russeting.

No. 2: Better than case 1 for colour, but still poor. Dull red on green background. Too much russeting for Jonathan. Quality looked poor in comparison with others. Not recommended.

No. 3: The apples in this case had a very yellow background, but little colour, making the fruit look sickly. Similar to early fruits from America. Blush was certainly under "Fancy" requirements. Fruit carried well. No bruises and firm, but hardly to be recommended.

No. 4: This case was the poorest of the lot. Grading was bad, and fruit more or less shrivelled. Very little colour showing. Greenish-yellow background. Few rots. Russeting immaterial.

No. 5: Fruits of good colour, showing up well on nice yellow background. Case opened up well and looked attractive. Probably a little too far advanced when shipped. Would easily bruise if packed tightly. No russet to speak of. Best case of the seven.

No. 6: Russeting bad—much more than case 4. Fruit shrivelled. Almost as poor as 4. Not recommended.

No. 7: This case was certainly too mature for shipment. Fruit too large. Many rots. Bruises very numerous. Should refuse such fruit for shipment.

Summary: Of this lot of Jonathan case 5 represented the best stage for shipment to London, although none of them could be considered to

be just correct, the case mentioned proving to be a little too far advanced. The Jonathans required on the London market are those with a good amount of colour showing in a background of yellow. The fruit must be firm and not too large, and, of course, without bruises. A small amount of russeting, but not as much as in case 6, is not looked upon seriously on the London market, provided the colour is well developed.

COMMERCIAL POTATO-GROWING.

(Concluded.)

H. E. McGOWAN, Willowbridge, South Canterbury.

COST OF GROWING.

THE cost of growing potatoes varies considerably in different districts; the figures here quoted are based on production in South Canterbury. I will take as example an area of 10 acres yielding 10 tons per acre, the crop being sold at £5 per ton f.o.b., sacks included. The cost per acre of growing the crop is as follows: Rent, £7; seed, ½ ton at £6 per ton, £3; ploughing twice at 10s. per time, £1; disking once, 2s.; harrowing twice at 1s. 6d. per time, 3s.; planting by machine, 15s.; cultivation twice between rows at 5s. per time, 10s.; moulding twice at 5s. per time, 10s.; spraying three times, 10s; hand hoeing and pulling weeds, £1; digging by machine at 1s. 6d. per sack, £8 5s.; sacks, 110 at 1s. each, £5 10s.; carting to railway, 110 sacks at 3d. each, £1 7s. 6d.; railage, say, 10s. per ton, £5; selling commission (5 per cent.), £2 10s.: total cost per acre, £37 2s. 6d. The sale receipts per acre on the 10-ton crop will be £50, being a profit of £12 17s. 6d. Taking the 10 acres, the cost works out at £371 5s., and the proceeds £500, leaving a profit of £128 15s.

NOTE.—If planted by hand, add £1 10s. per acre. If dug by hand, add 1s. per sack, or £5 10s. per acre. All grading and loss of weight through storing must also be deducted.

SUMMARY.

The following summarizes the more important points dealt with in this series of articles:—

Potato-growers should strive to produce heavier crops from smaller areas, and stick to standard varieties. Improve the crop by careful seed-selection and change of seed. Procure the seed from reliable growers. Rotation of crops is an important factor for success. Thorough and deep cultivation is more important for successful potato-growing than for any other crop. Plant early, and remember that every hill missed means a percentage off the crop. Straight rows evenly spaced mean less trouble for after-cultivation and digging, beside having a pleasing effect on the critical eye. Well-chosen commercial fertilizers have been shown to be profitable. Disease-resistance in potatoes is relative and not absolute, no variety known being wholly proof. Insure the crop by careful and constant spraying with bordeaux or burgundy mixture. The use of good machinery for potato-growing is one of the most important factors in making a crop profitable; this

applies chiefly to the planter, digger, and grader. Dig as soon as the crop is ripe, and market promptly. Do not speculate by holding the potatoes until the end of the season in anticipation of higher prices, unless in a position to lose the value of the crop. Pack the potatoes in new sacks carefully branded; make the grade A1, and your brand will be a trade-mark which will soon be in demand. If stored, keep the potatoes absolutely dry, and turn them over frequently to prevent sprouting; if pitted, turn or bag up as soon as the tubers begin to sprout. Growers in all districts should have their association to facilitate distribution to the consumer and to discuss matters of interest to growers generally.

The foregoing completes the series on potato-growing proper, but some extra matter dealing briefly with certain related subjects is appended.

THE POTATO AS A FOOD.

The potato is estimated to constitute about 20 per cent. or one-fifth of the total food material consumed in this country, and other countries with a similar dietary. From this it can be readily seen what a serious matter would be a potato famine. The composition of cooked potatoes compared with that of white bread, as shown in the following table, may be of interest:—

——	Water.	Protein.	Fat.	Carbo-hydrates.	Ash.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Potatoes (boiled) ..	75·5	2·5	0·1	20·9	1·0
Potato-chips (fried) ..	2·5	6·5	39·8	46·7	4·5
White bread ..	35·8	9·2	1·3	52·6	1·1

It will be seen that carbohydrates (sugar, starch, &c.) form the principal solids of the potato, and these are an excellent fuel for keeping up the warmth of the body and supplying it with the energy needed for muscular activity. The proper cooking of potatoes so that the tubers will be in the best possible condition for eating is, however, a matter which is by no means always understood and carried out in the household.

For Live-stock.—Every potato-grower will have a quantity of culls or tubers which are unfit for the market as table potatoes or seed. These should be used on the farm for the stock, and if fed with a certain amount of common-sense will provide quite a good return for the trouble taken in preparing them. Pigs are very fond of potatoes, but owing to the risk of solanine poisoning they should be boiled or steamed. Fed with skim-milk, and, if possible, a little ground grain, bran, or pollard, a well-balanced ration is obtained on which the pigs will fatten readily. Cows, horses, and sheep relish raw potatoes. These should not be fed too heavily at first, and a little hay or straw should be given to make a better-balanced ration. Cows will milk well, also fatten, on potatoes and hay. In order to avoid the danger of choking, the potatoes should be cut up.

OVERSUPPLIES AND HOW TO DEAL WITH THEM.

In a number of countries, notably the United States, France, and Germany, means have been provided for dealing with an oversupply

of potatoes, thereby preventing the heavy losses which often occur where such industrial facilities do not exist. No later than last season large quantities—probably thousands of tons—of table potatoes were allowed to rot in Canterbury simply because there was an oversupply for food, and we had no other means of turning them into a source of revenue. In the Willowbridge district alone some of the individual growers' losses ran into four figures.

Distillate.—In the countries already referred to, during the war, owing to the comparative scarcity of petrol, distilleries were built, and various starch-yielding vegetable substances used to make spirit. Potatoes are specially adapted for this production. According to American data, a small potato-distillery to deal with about 5 tons of potatoes per day costs approximately £3,000, and could be run by three men. Five tons of potatoes will produce about 190 gallons of 100-per-cent. proof spirit, valued at some £30. There is about 1,000 lb. of slop or refuse per day, which would form the major portion of a ration for fifty head of fattening bullocks. This slop has been found to be a feeding-stuff of high value, and enough should be made out of this to pay the running-costs of the factory. Potatoes converted into industrial alcohol, and the slop by-product, should return the grower between £4 and £5 per ton. A few of these factories or distilleries distributed through our potato-growing districts should prove a good investment for a small company, and would be a boon to potato-growers generally, besides supplying large quantities of distillate for engine use, &c. Seeing that the price of motor-spirits is considerably less in the United States than in New Zealand, the profits should be considerably greater from a distillery operating here.

Potato-flour. — During the war period numbers of factories were built in America and Germany for converting potatoes into flour. Evidently the proposition was a satisfactory one then, but with large supplies of wheat on hand these factories have all closed down. This method of dealing with potatoes is first to wash them thoroughly and then slice—this, of course, being done by machinery. They are next placed in a kiln (similar to a hop-kiln) and dried. As soon as the sliced potatoes are absolutely dry they are bagged, taken to an ordinary flour-mill, and passed through, the skins being removed in the same way as bran is removed from wheat. The flour contains a higher percentage of starch than wheaten flour, and the two mixed in the proper proportions make a wholesome bread. Potatoes treated in this way would return about £3 per ton, therefore industrial alcohol is a decidedly better proposition.

Packing of Milk-samples.—The postal authorities desire attention drawn to the fact that from time to time parcels and packets containing milk, addressed to the Veterinary Laboratory, Wallaceville, are posted insufficiently packed according to the regulations—rendering them liable to detention. The samples in question are, of course, mainly those forwarded to the Laboratory in connection with suspected cases of contagious mammitis. The postal regulations permit samples of milk to be forwarded through the post if enclosed in glass bottles hermetically sealed and packed in sufficient sawdust or other absorbent material to absorb the milk in the event of breakage, and the whole enclosed in a strong outer covering, preferably a wooden box. Senders of samples should therefore be careful to conform to these directions. The correct postal address is Wallaceville Veterinary Laboratory (private bag), Wellington.

CROSS-FERTILIZATION OF WHEAT.

EXPERIMENTAL WORK IN CANTERBURY.

At a recent meeting of the Philosophical Institute of Canterbury Dr. F. W. Hilgendorf, Biologist to the Canterbury Agricultural College, gave an account of a case of wholesale cross-fertilization of wheat, and of some subsequent experimental work on the matter. He stated that wheat almost always was self-fertilized, and until ten years ago cases of cross-fertilization were so rare that they were considered questionable when reported. In the harvest of 1920, at the Agricultural College at Lincoln, some pure strains of Tuscan wheat were found to contain many different types, and, as the mixture was much too great to be explained by accidental admixture, another explanation was sought. It was remembered that at the harvest of 1919 those strains of Tuscan wheat were much injured by a frost, the yield being cut down from an estimated 60 bushels to an actual 25 bushels per acre. It was thought that the frost might have been of such an intensity as in some florets to kill the anthers but not the ovaries, and if those ovaries were fertilized and developed they must have been cross-fertilized.

In order to test that hypothesis, many selections were made from the supposed crossed strain and grown under close supervision to see if the strain showed variation. These have just been harvested and show great variation, the supposed strains "breaking" into two types of head—namely, (1) Tuscan, and (2) Velvet chaffed. This result at least indicates that the wheats are of dual parentage—Tuscan and Velvet, the latter being the male parent. The fact that the Tuscan strains were growing between plots of Velvet strains shows that this was probably the case.

The minimum temperature at Lincoln on the night of the damaging frost was known, and Mr. H. F. Skey, officer in charge of the Magnetic Observatory in Christchurch, supplied a thermogram of the changes in temperature on the same night. From these a good idea of the temperature, and its duration, to which the wheat was subjected was calculated, and some plants just ready to flower were subjected to those conditions in freezing-chambers at Islington. The result was that 16 per cent. of the anthers were killed, but as far as can be seen at present the ovaries were uninjured.

The plants, which were growing in pots, were then placed in a crop of Velvet wheat which was flowering at the time, and some of those florets in which the stamens were destroyed have now developed. Of course, they may have been pollinated by pollen from other florets of the same head, but it is also possible that pollen from a Velvet strain may have fertilized them, and it is the latter assumption which is at present commanding attention. To clear up this point seeds from the treated plants will be sown in the coming season. If the assumption is a correct one their progeny should produce the two types mentioned previously, and should this occur the investigation will show that wholesale cross-fertilization of wheat can take place, given suitable conditions

of temperature. It will also provide a complete explanation of the origin of new wheats. From a plant-breeder's point of view the observation is of great importance, as it provides a very rapid means of crossing wheats—hundreds of times quicker than the methods now used.

QUALITY OF NEW ZEALAND HEMP.

INVESTIGATIONS IN THE AMERICAN TRADE.

ALFRED SEIFERT, Palmerston North.

FREQUENT complaints have reached New Zealand of late from abroad regarding the quality of our hemp (phormium-fibre), many of the cordage-manufacturers stating that the official Hemp Graders had lowered the standard of each grade, and that the hemp they had bought lately was not nearly as good as the lines they purchased some time previously under the same grade. On the other hand, the millers in New Zealand claim that the quality has been fully up to the usual standard ruling for the last few years. Having read a great deal of the correspondence that came through, and being also conversant with the millers' views, I felt that we could not get at the root of the trouble without personally interviewing some of the cordage-manufacturers who had used large quantities of our hemp and had recently made complaints as to the quality. I therefore arranged while visiting the United States of America last year to get in touch with several of these firms, and also to interview the hemp-brokers who have dealt largely in our fibre. I was greatly helped in my investigation by letters from the Hon. W. Nosworthy, Minister of Agriculture, and also from the president of the New Zealand Flax-millers' Association.

All the people I met in the course of the investigation willingly gave me every assistance. At the cordage-factories visited large numbers of bales of our hemp, representing different brands, were opened up for my inspection, and the bad features from a cordage-manufacturer's viewpoint were pointed out. I was also taken through the factories and shown the effect that bad-quality fibre had on the cordage. It became clear to me that the New Zealand flax-millers were not turning out a hemp that suits the trade, and I noted on what points we should concentrate to improve the quality. The cordage-manufacturers and hemp-brokers stated that they regretted very much that our hemp had become unsuitable, because dealing in New Zealand fibre had been very satisfactory, and that they would like to continue doing business, and would do so if our hemp was dressed to suit them. I am satisfied that we can supply what they require and, consequently, hold the trade.

Before proceeding to explain the faults in our fibre I wish to express the opinion that even if the Hemp Graders had raised the standard for each grade complaints would have come forward just the same, because attention would have been paid in the grading to points that do not count, while vital points would have been missed. This would have discouraged the millers, and, by doing so, would have done much injury to the industry.

FAULTS WHICH REQUIRE SPECIAL ATTENTION.

The faults in New Zealand hemp will now be dealt with, commencing with the most objectionable features.

Badly cleaned (also called "Barky" or "Dirty") Tails.—This is much the worst fault. Those who manufacture our fibre into cordage demand it with clean tails similar to the tails of manila and sisal fibre, which are absolutely clean. To ensure this it will be necessary to sort the leaf into lengths before stripping, and then use a special tailing-machine, or hackles on the scutcher. This would cause a little extra waste, and, where hand-scutchers are used, a little extra expense in labour. But the position must be faced; our fibre will never be sought after in the trade referred to until the tails are properly dressed. This applies to fibre of all grades.

Runners (often called "Thin Edges" and "Ribs").—This fault spoils the appearance of the cordage, and gives it an appearance of low quality. Runners are often due to the stripper-drum having too much spring, the drum being badly dressed, uneven feeding, and giving the feeder leaf of uneven length to feed. Sorting the leaf into lengths will greatly help the stripper-keeper to dress the fibre without this objectionable feature.

Tow Balls.—Tow balls in the fibre are strongly objected to. They are probably caused by the thread being slightly broken, which may be due to the stripper-drum being badly dressed, or to uneven feeding. I was shown what tow balls will do to the cordage, and could easily understand why the fibre is not liked when this fault is present. I am sure that if the stripper were carefully kept and the tails cleaned by a hackling process we would hear no more about our fibre being unsatisfactory in this respect.

Colour and Strength.—Though it is absolutely necessary for the fibre to have plenty of strength and to be fairly uniform in colour, few complaints were made about these features of our fibre. One cordage-manufacturer told me that they had never yet had to make a complaint about the strength, and that the colour was usually satisfactory. He added that, of course, they could not use fibre deficient in strength, but the average New Zealand fibre had all that was required. In regard to colour, our hemp would not be more popular if it were quite white like sisal. It is interesting to note that the cordage made in America is coloured to give it a yellow tinge like the colour of manila-fibre. This is done by putting some colouring-matter in the oil that is put on the fibre while it is being made into cordage. This enables a uniform-coloured cordage to be made out of mixed fibre, besides supplying twine of the colour the farmers like.

GENERAL REMARKS.

The quality of a large proportion of New Zealand hemp as now dressed is not satisfactory—there can be no doubt about this. But if the fibre is dressed with clean tails, and free from thin edges and tow balls, I am confident that it will maintain popularity in the American cordage-factories. Millers are therefore strongly recommended to make the quality that will suit the trade. This can be done by slightly altering the present method of dressing the fibre, and general attention all round. It will pay well, because a satisfactory article, whether New Zealand hemp or anything else, is practically always in demand, while

no one wants an unsuitable article. There is a certain quality that will suit about 90 per cent. of the trade. This quality is within the reach of our millers without adding much to the cost of manufacturing the fibre. Those who have exceptionally good leaf could make a better quality, and they would receive a higher price for it.

I would suggest, in connection with improvements in system, that further information might be obtained from other cordage-manufacturing centres, especially Australia, where large quantities of our hemp are used. We now know what kind of fibres the Americans demand, and as some of the firms there have branches in Europe opinions in America may be held to partly reflect opinion in Europe.

In conclusion, I wish to express the opinion that the prospects for New Zealand hemp are good, and that if dressed without the faults here mentioned it will average a better and more uniform price; further, that the extra cost of dressing the fibre to the quality required will be repaid over and over again in the higher return for the better article produced.

The following official statistics, showing the quantity and value of various fibres imported into the United States during the ten months, January to October inclusive, of 1920 and 1921 respectively, are appended to show the worth of the American trade. It will be noted that, though the quantities imported fell all round in 1921, the fall was greatest in proportion in the case of New Zealand hemp.

Fibre.	1920.		1921.	
	Tons.	Dollars.	Tons.	Dollars.
Manila	55,989	17,410,539	28,439	5,421,360
Sisal	159,124	30,409,506	103,406	12,669,479
New Zealand ..	5,346	918,827	879	146,951
Other fibres	6,362	1,171,490	4,696	814,249

Ferrets for Disposal.—The Department has a limited number of ferrets for disposal to *bona fide* farmers, price 7s. 6d. each, plus 1s. package. Orders should be addressed to the Officer in Charge, Wallaceville Veterinary Laboratory (private bag), Wellington, accompanied by remittance covering charges stated.

Importation of Plants, &c., into Australia from New Zealand.—Advice has been received from the Government of the Commonwealth that owing to the existence of fireblight in New Zealand the importation into Australia from the Dominion of all plants and parts of plants (including fruit) is prohibited; provided that agricultural seeds, grass-seeds, vegetable-seeds, flower-seeds, and the seeds of pine-trees may be imported, subject to the exception of the seeds of any plant of the family Rosaceae and the seeds of any fruit-tree.

Locally produced Putty.—In his last annual report the Department's Chemist states that certain soft limestones have been examined for putty-making, and other earthy materials have been similarly tested. A local factory has been instrumental in making practical tests of these raw materials, and has been assisted in utilizing these and other raw materials of indigenous origin. It is satisfactory to know that putty is now being successfully made from New Zealand chalk, about 2 tons of this and 10 tons of distemper having been made by a Wellington manufacturer during the year.

SEED-TESTING NOTES.

NELSON R. FOY, Biological Laboratory, Wellington.

MEADOW-FOXTAIL.

MEADOW-FOXTAIL (*Alopecurus pratensis*) is one of the most valuable of our pasture grasses, and among the most highly priced grass-seeds. A great deal of the dissatisfaction that has arisen at times in the use of meadow-foxtail is due to inferior low-germinating seed. This emphasizes the necessity of paying every attention to the quality of the seed bought. The extremely low germination of foxtail-seed is due to the irregular ripening of both the seed in the head and the seed-heads themselves. Consequently a large percentage of a line usually consists of light chaffy glumes, devoid of kernels. Thorough machine-dressing will, of course, remove these empty glumes, but as this process causes a considerable loss in weight it is usually not carried out sufficiently to produce a high-germinating line.

Meadow-foxtail seed may be graded as follows: (1) Over 50 per cent. germination—first-class commercial line; (2) 35 to 50 per cent. germination—good average quality; (3) 20 to 34 per cent. germination —below average quality; and (4) under 20 per cent. germination—line of very little value.

During the last two years seventy-three commercial samples have been tested for germination at the seed-testing branch of this Laboratory. Of these a large number were samples of New-Zealand-grown seed, which, owing to unfavourable harvesting conditions and the prevalence of the foxtail-midge, were of a very inferior germination. Of the seventy-three samples tested ten, or 14 per cent., germinated less than 10 per cent.; twelve, or 16 per cent., between 11 and 20 per cent.; twenty-six, or 36 per cent., between 21 and 30 per cent.; twelve, or 16 per cent., between 31 and 40 per cent.; five, or 7 per cent., between 41 and 50 per cent.; seven, or 10 per cent., between 51 and 60 per cent.; one, or 1·5 per cent., between 61 and 70 per cent. Maximum, 69 per cent.; minimum, 0·0 per cent.; average, 26·8 per cent.

It may be mentioned here that the Irish seed-testing method of using all the seeds, whether they contain kernel or not, is employed in this Laboratory. Thus the figures given above represent the actual germination per 100 of the seeds irrespective of whether they are matured or not. In most of the European seed-control stations the germination percentage is given on selected full seeds, and in consequence the germination is very much higher than that obtained by the Irish method. This can be cited as the reason for the failure of so many imported lines to germinate within approximately 40 per cent. of the germination percentage upon which they were imported from Europe.

Bushel weight is of great importance in the rapid determination of the value of different lines, as the lighter the bushel weight the greater is the percentage of empty glumes. Inferior foxtail-seed may at times weigh as little as 5 lb. or 6 lb. per bushel, while high-grade seed may go as high as 12 lb. to 14 lb. A good average line should weigh not less than 8 lb. or 9 lb. per bushel.

Owing to the extreme difficulty in cleaning meadow-foxtail, samples frequently contain a large number of extraneous seeds both in species and in numbers. It is noticeable that various agricultural textbooks often enlarge considerably upon the amount of Yorkshire fog that is likely to occur in foxtail. Experience in this Laboratory, however, has shown that such occurrence is very rare, the main impurities being Poa pratensis and fescue of the Chewings type, both useful grasses in permanent pasture. With the exception of one sample containing ox-eye daisy, no noxious weeds have been found to be present. At the same time the large number of impurities — useful and harmful — that are usually present in foxtail-seed renders the determination of its purity important.

During the past twelve months twenty-four samples have been analysed for purity, and forty-four species of extraneous seeds have been noted. The following list gives the names and frequency of occurrence (the number of samples in which they occurred) of the main species: Smooth-stalked meadow-grass (*Poa pratensis*), 18; fine-leaved fescues, 18; tufted hair-grass, 15; sour dock, 14; common caraway, 12; wild-beaked parsley, 10; creeping buttercup, 7; perennial rye-grass, 7; timothy, 6; rough-stalked meadow-grass (*Poa trivialis*), 6; wind-grass, 5; sorrel, 4. Maximum, 7·5 per cent.; minimum, 0·1 per cent.; average, 2·0 per cent.

POA TRIVIALIS.

The seed of the rough-stalked meadow-grass (more commonly known by its botanical name of Poa trivialis) is very expensive, and good seed is difficult to obtain. For these reasons, therefore, the determination of the quality of a line becomes essential.

The germination of Poa trivialis is usually fairly low, although really good lines will germinate as high as 90 per cent. It can be graded on its germination capacity as follows: 75 to 100 per cent. represents first-class commercial lines; 60 to 74 per cent., good average lines; 40 to 59 per cent., lines below average quality; under 40 per cent., lines of very little value.

During the past twelve months fifteen samples have been tested for germination. Of these, three samples germinated under 10 per cent., one between 11 and 20 per cent., three between 21 and 30 per cent., one between 31 and 40 per cent., one between 41 and 50 per cent., one between 51 and 60 per cent., two between 61 and 70 per cent., one between 71 and 80 per cent., and two between 81 and 90 per cent. Maximum, 90 per cent.; minimum, 3 per cent.; average, 41 per cent.

Nearly all the seed of Poa trivialis is of European origin.

The seed of trivialis is particularly free from extraneous seeds. Out of ten samples analysed for purity during the past twelve months only one contained up to 0·5 per cent. of impurities, the remainder all being 99·9 per cent. pure. In the samples examined for purity six species of extraneous seeds were noted. The following list gives the names and numbers of samples in which they occurred: Timothy, 5; mouse-eared chickweed, 4; knee-jointed foxtail, 2; hawkweed, 1; hair-grass, 1; alsike, 1.

The presence of knee-jointed foxtail is a fairly sure indicator of locally grown seed. One hears at times of the possibility of the adulteration of Poa trivialis with seed of the less valuable Canadian blue-grass (*Poa compressa*), but no such cases have yet come under the notice of this Laboratory.

PIGS IN NEW ZEALAND.

SOME HISTORICAL NOTES.

K. W. GORRINGE, Instructor in Swine Husbandry, Live-stock Division.

Pigs were introduced into New Zealand by the great navigator Captain James Cook, on his second visit, in 1773. Records show, however, that they were animals which he had procured from the Natives at Tahiti—not brought from England as is commonly supposed. Cook arrived at Dusky Bay in March, and remained there for some time. About the middle of the year, owing to scurvy among his crew, he sailed away temporarily to the Society Islands, where a supply of pigs was obtained. After his return to the New Zealand coast it is recorded that in October two boars and two sows were given by him to a chief at Table Bay, and one boar and two sows to Natives in Queen Charlotte Sound. It is also recorded that Captain Furneaux, of the "Adventure" (the other ship of Cook's expedition), in June gave certain pigs to chiefs at Cannibal Cove, and others to Natives at Cape Kidnappers. Other pigs must also have been liberated at various points.

In 1793 Governor King, of New South Wales, when visiting the Bay of Islands, presented the Natives with ten sows and two boars of a very large breed, presumably large Irish. In 1805, in compliance with Governor King's instructions to Captain Piper, Commandant of Norfolk Island, the following pigs were sent to Te Pahi, Bay of Plenty: By the "Adonis," eighteen sows and two boars; by the "Venus," two sows; by the "Argo," six sows and two boars.

From Maori narrative it is evident that many pigs were also acquired by the Natives in early days from whalers and others whose ships had previously called at the South Sea Islands. It appears, indeed, that the first pigs landed at Port Nicholson were from a whaling-vessel. In the late "thirties" a pioneer ship of the New Zealand Company is recorded to have landed pigs of superior breeding at a calling-place on the South Island side of Cook Strait. In 1843 Mr. A. Saunders, of Nelson, imported a number of the large and small breeds of Berkshires. An article written by a Nelson resident in 1846 refers to the landing of some pigs of American breed.

In 1852 two young chiefs were by misadventure carried on to France by ship, and on their return brought back with them some pigs. The breed of these animals is unknown, but they were probably something better than the Natives had here. It is probable that in the "fifties" most of the ships brought a few pigs of the various types now in the country, the emigrants being advised that it might be worth while to take out a few pigs of the best breeds from England, as they could easily be carried on the vessel with them. Some Berkshires and animals of other breeds were introduced in this way into the settlements and were sold at high rates.

Between 1858 and 1861 it seems that there were plenty of pigs being domesticated, and sufficient for local needs, which left the wild pigs to increase so rapidly as to become a menace to farmers and run-

holders. North Canterbury at this time was overrun with wild pigs. It became imperative to destroy them, and contracts were let with the result that 25,000 pigs were destroyed during four years on an area of 400,000 acres to the north of Ashley, besides thousands killed by shepherds on runs. In the Hurunui district 10,000 were killed without apparent diminution of numbers. Even at the present time many districts have large numbers of wild pigs which cause damage to crops and young lambs. This is especially noticeable in and around the Marlborough Sounds, &c.; also in several North Island localities.

From the year 1858 to 1886 it may be taken that there were plenty of pigs in the country, keeping pace with the increase of the population, as instanced by the following census returns: 1858, 40,734 pigs; 1878, 207,337; 1886, 277,931. The last figures quoted are of special interest as showing that in 1886 there were more pigs in the country than in 1919 and 1920, when, after several years' decline, the returns were only 235,347 and 266,829 respectively. The enumeration of 1921, however, shows a substantial increase to 349,892.

Very little is known as to purebred pigs imported during the "sixties" and early "seventies," but from the year 1878 we have records of breeders such as J. Rowe, C. Brice, J. C. Grigg, G. E. Rhodes, the Sunnyside and Seacliff Mental Hospitals, and others in the South Island, with Slack Bros., E. J. Rogers, S. R. Lancaster, the Porirua Mental Hospital, and others in the North Island. The South Island must be credited with the first establishment of stud herds. The progeny of these herds was widely distributed, and at the present time there are a number of noted studs in both Islands. This has resulted in the very marked improvement in the type and conformation of the general run of pigs in the several provinces. One seldom sees nowadays on our farms animals of the nondescript, rough-haired, long-nosed, hard-to-fatten sort. Farmers now realize the importance of introducing good blood into their herds.

Another advance has been the establishment of a pedigree herd-book for New Zealand by the New Zealand Pig-breeders' Association (Inc.), Feilding, which was registered on 17th November, 1916. The first volume of the Herd-book appeared in 1918, and comprised a membership of 63. The second volume in 1919 had an increase in membership to 102. The third and fourth volumes, when completed, are expected to show in the vicinity of 200 members.

During the early periods of settlement the bacon-curing was done almost entirely on the farms, but as the population increased it was found necessary to establish this as a business, and proprietary concerns arose in the various provinces. It is not on record which was the first bacon-curing works, but among the earliest in the South Island are noted McDonald and Miller, of Green Island, Otago; Quinn and Co., Invercargill; and Green and Co., Christchurch; while for the North Island may be mentioned the Wellington Bacon Company (Wilson and Martin); W. Dimock and Co.; Drake, of New Plymouth; Buchanan Bros., Eltham; and others in the Auckland Province.

Since the year 1900 considerable interest has been displayed in the formation of co-operative bacon companies, with the result that various small concerns came into existence, but from various causes these did

not meet with the success expected. It was in 1916 that the big co-operative movement took place, when an amalgamation of interests resulted in the formation of the New Zealand Farmers' Co-operative Bacon and Meat-packing Company (Limited) (now the New Zealand Meat-packing and Bacon Company (Co-operative), Limited).

NOTE.—The writer is indebted to Mr. Elsdon Best, Dominion Museum, Wellington, for assistance in gathering data regarding the early history of the pig in New Zealand.

SOME RECENT CHANGES IN THE NAMES OF PLANT-DISEASES.

[Concluded from January Issue.]

G. H. CUNNINGHAM, Biological Laboratory, Wellington.

KEY TO THE REASONS FOR CHANGES IN NAMES.

In the several parts which follow the reason for the change in scientific names is indicated in each case by a Roman numeral "I," "II," &c. This numeral indicates that the change has been made for the reason briefly summarized in the corresponding key paragraph as follows :—

I. Change necessitated through the perfect stage of the causative organism becoming known.

II. Change necessitated through the generic name of the causative organism becoming untenable.

III. Change necessitated through the adoption of the International Botanical Rules, Brussels, 1910.

IV. Change necessitated by the difference between American and international nomenclature.

V. Change necessitated through the previous wrong determination of the causative organism.

Rejected common names are also given, but are not keyed—*i.e.*, the reason for rejection is not given in their case.

PART IV.—DISEASES OF FIELD CROPS.

The diseases coming within this category are divided according to the three main classes of crops affected—namely, (*a*) cereals, (*b*) forage crops, and (*c*) root crops. Within these classes the various diseases have been further grouped under the name of the particular crop attacked. As in the preceding sections, diseases are shown in alphabetical order under their common names.

(*a.*) CEREALS.

Under this heading are included the diseases affecting (1) barley, (2) maize, (3) oats, (4) rye, and (5) wheat.

(*1.*) *Barley.*

87. **Barley-rust,** *Puccinia simplex* (Koern) Erikss. et Henn.

Puccinia straminis Fcl. var. *simplex* Koern.

This is the common rust of barley; it is common on sheaths and blades, but less so on stems. It is readily separated from black-rust, which also attacks this host, by the fact that the uredosori of the latter rust become naked and powdery, while this stage of *P. simplex* is long covered and remains compact.

(93.) **Black-rust,** *Puccinia graminis* Pers.

(See under " Wheat.")

88. **Covered Smut,** *Ustilago Hordei* (Pers.) Kell. et Sw.

II. *Uredo Hordei* Pers. V. *Ustilago Jensenii* Rostr. V. *Ustilago segetum* (Bull.) Dittm. p.p.

The sorus of this smut remains as a compact mass, enclosed in the glumes and covered by the walls of the ovary ; hence the name " covered smut."

89. **Naked Smut,** *Ustilago nuda* (Jens.) Kell. et Sw.

V. *Ustilago nuda—Hordei* Jensen. V. *Ustilago segetum* (Bull.) Dittm. p.p. Loose smut ; barley-smut.

This is distinguished from covered smut in that the sorus soon becomes powdery. After a time the spores disappear altogether, leaving the bare axis of the inflorescence.

(100.) **Wheat-scab,** *Gibberella Saubinetii* (Mont.) Sacc.

(See under " Wheat.")

(2.) Maize.

90. **Maize-rust,** *Puccinia Sorghi* Schw.

V. *Puccinia Maydis* Bereng.

This rust forms linear brown patches on both surfaces of the leaf. So far, I have obtained it but once—on sweet-corn at Ruakura.

(3.) Oats.

(93.) **Black-rust,** *Puccinia graminis* Pers.

(See under " Wheat.")

(94.) **Cereal Mildew,** *Erysiphe graminis* DC.

(See under " Wheat.")

91. **Crown-rust,** *Puccinia coronata* Cda.

V. *Puccinia Lolii* Niels. III. *Puccinia coronifera* Kleb. V. *Puccinia Lolii* Niels. f. *Avenae* Erikss. Summer rust.

This is our common oat-rust. It appears as a rule early in the season, before the inflorescences have appeared ; it may readily be separated from black-rust by the brighter colour of the spore-masses, and by the fact that it is generally confined to the leaves. *Puccinia Lolii* Niels. has been separated from *P. coronata* because its æcidia are found on a different host ; otherwise they are identical.

92. **Oat-smut,** *Ustilago Avenae* (Pers.) Jens.

II. *Uredo Avenae* Pers. V. *Ustilago perennans* Rostr. Loose smut.

This smut attacks and destroys the ovaries, forming black spore-masses in their stead. After a time these spores are carried away by wind or other agency, leaving the bare axes of the inflorescences.

(4.) Rye.

(93.) **Black-rust,** *Puccinia graminis* Pers.
(See under " Wheat.")

(95.) **Leaf-rust,** *Puccinia dispersa* Erikss. et Henn.
(See under " Wheat.")

(5.) Wheat.

93. **Black-rust,** *Puccinia graminis* Pers.

Stem-rust ; wheat-rust.

This rust attacks a great number of grasses and cereals. It is probably perpetuated by the uredo stage alone, as æcidia have not been found in New Zealand. The linear, black, naked teleutosori, which usually occur on the stems, make this rust very conspicuous in the autumn, and serve to distinguish it macroscopically from any other rust of wheat.

94. **Cereal Mildew,** *Erysiphe graminis* DC.

Wheat-mildew.

This fungus covers the leaves and sheaths with a thick felted layer of mycelium, which at first is white, but soon changes to a smoky-grey colour.

95. **Leaf-rust,** *Puccinia dispersa* Erikss. et Henn.

V. *Puccinia rubigo-vera* Wint. V. *Puccinia Bromina* Erikss. V. *Puccinia Triticina* Erikss. V. *Puccinia glumarum* Erikss.

The uredosori occur in scattered orange- or ferruginous-coloured clusters on the leaves, and less commonly on sheaths and stems. The teleutosori are small and black, and are long covered by the epidermis. This rust appears to be perpetuated by the uredospores alone.

96. **Loose Smut,** *Ustilago Tritici* (Pers.) Jens.

II. *Uredo Tritici* Pers. V. *Ustilago segetum* (Bull.) Dittm. V. *Ustilago Hordei* Bref. p.p. V. *Ustilago Tritici,* f. *folicola* P. Henn.

This fungus attacks and destroys the ovaries. The spores are readily dislodged by wind, &c., so that in attacked plants one commonly finds the bare axes of the inflorescences left.

97. **Stinking Smut,** *Tilletia levis* Kuehn.

V. *Ustilago foetens* Berk. et Curt. nomen nudum. V. *Tilletia foetens* (B. et C.) Trelease.

As this species cannot be distinguished macroscopically from the next, both are discussed together below.

98. **Stinking Smut,** *Tilletia Tritici* (Bjerk.) Wint.

II. *Lycoperdon Tritici* Bjerk. V. *Tilletia caries* Tul. p.p. Bunt.

These two species are characterized by their penetrating odour, which somewhat resembles that of decaying fish. Their presence is often difficult to detect owing to the fact that the spore-masses remain agglutinated together, and are usually partially concealed by the glumes.

Both species may occur in the same ear, and the two can be separated only with the aid of the microscope, when the spores of *T. levis* are seen to be smooth, while those of *T. Tritici* are covered with a fine network.

99. **Take-all,** *Ophiobolus graminis* Sacc.

White-heads; foot-rot; black-leg; straw-blight.

This fungus appears to attack and destroy the roots and bases of the stems. Its presence may usually be detected by the whitened appearance of the heads, stunted growth of infected plants, and the presence of masses of dark-brown or black mycelium covering the stems at the ground-level. Infected plants are readily pulled out of the ground owing to the roots being destroyed by the fungus.

100. **Wheat-scab,** *Gibberella Saubinetii* (Mont.) Sacc.

II. *Gibbera Saubinetii* Mont. I. *Fusarium Hordei* (W. G. Sm.) Sacc. I. *Fusisporium Hordei* W. G. Sm. I. *Fusarium graminearum* Schub. I. *Fusarium graminum* Cda. I. *Fusarium heterosporum* Nees. Fusarium blight.

The conidial stage of this fungus attacks the ears, where it forms gelatinous orange or red masses on the grains; it also attacks the stems and roots, in many cases causing the death of the plant. The perfect stage is produced in abundance on the dead areas. Rye, barley, and wheat are attacked.

(*b.*) FORAGE CROPS.

Under this heading are included the diseases affecting (1) clover and lucerne, and (2) grasses.

(1.) Clover and Lucerne.

101. **Clover-rust,** *Uromyces flectens* Lagerh.; *U. Trifolii* Lev.; and *U. Trifolii-repentis* Liro.

V. *Uromyces fallens* Kern.

There are three species of rust common on clover in New Zealand. As they are difficult to separate other than with the microscope, all three are retained here under the one heading. *U. Trifolii-repentis* is confined to white clover and alsike, while none of these three rusts will infect lucerne.

102. **Clover-spot,** *Pseudopeziza Trifolii* (Biv-Bern.) Fcl.

II. *Ascobolus Trifolii* Biv-Bern. Clover leaf-spot.

This fungus forms small dark-coloured spots on the leaves. Where attacks are severe defoliation may occur. Infection is confined to clover.

103. **False Mildew,** *Peronospora Trifoliorum* de Bary.

Clover-mildew.

This fungus infects clover and lucerne. On the under-surface of the leaves of these plants it forms ashy-grey patches, the upper surface of the leaves above these patches becoming yellow.

104. **Lucerne-rust,** *Uromyces striatus* Schroet.

V. *Uromyces Medicaginis* Pass.

This rust in New Zealand is confined to lucerne. It is similar in appearance to clover-rust.

105. **Lucerne-spot,** *Pseudopeziza Medicaginis* (Lib.) Sacc.

II. *Phacidium Medicaginis* Lib.

This fungus forms a spot on the leaves of lucerne similar in appearance to that caused by clover-spot.

106. **Stem-rot,** *Sclerotinia Trifoliorum* Erikss.

Clover stem-rot; lucerne stem-rot; clover sickness.

This fungus causes a rotting of the stems of clover and lucerne at or above ground-level. It is probably identical with *Sclerotinia Libertiana* Fcl.

107. **Yellow leaf-blotch,** *Pyrenopeziza Medicaginis* Fcl.

I. *Sporonema phacidiodes* Desm. I. *Ascochyta Medicaginis* Fcl. I. *Phyllosticta Medicaginis* (Fcl.) Sacc.

This fungus causes a yellow discoloration of leaves and stems of lucerne. The leaves in consequence soon die and fall away.

(2.) Grasses.

The various grasses are not dealt with separately, as in most instances the same organism attacks many different hosts.

(93.) **Black-rust,** *Puccinia graminis* Pers.

(See under "Wheat.")

This rust is common on a large number of grasses.

108. **Cocksfoot-rust,** *Uromyces Dactylidis* Otth.

This rust is confined to cocksfoot. Although common throughout New Zealand, it has not hitherto been recorded for Australasia.

(91.) **Crown-rust,** *Puccinia coronata* Cda.

(See under "Oats.")

This rust is common on perennial and Italian rye-grass, darnel, and Yorkshire fog.

109. **Ergot,** *Claviceps purpurea* (Fr.) Tul.

II. *Sphaeria purpurea* Fr. I. *Sphacelia segetum* Lev.

The sclerotia of this fungus are common on certain grasses, especially cocksfoot, rye-grass, and tall fescue.

110. **Poa-rust,** *Puccinia Poarum* Niels.

This rust is confined to the genus *Poa*.

111. **Red Thread,** *Hypochnus fuciformis* McAlp.

V. *Isaria fuciformis* Berk.

This fungus is conspicuous on account of the brilliant red colouring of the mycelium, which spreads over the leaves and stems of grasses.

(c.) ROOT CROPS.

Under this heading are included the diseases affecting (1) mangolds, (2) potatoes, and (3) rape, swedes, and turnips.

(1.) Mangolds.

(68.) **Beet-rust,** *Uromyces Betae* (Pers.) Kuehn.

(See under "Beets and Mangolds.")

(69.) **Heart-rot,** *Mycosphaerella tabifica* (Prill. et Del.) Johns.

(See under "Beets and Mangolds.")

(2.) Potatoes.

112. **Corticium Rot,** *Corticium vagum* DC. var. *Solani* Burt.

V. *Hypochnus Solani* Prill. et Del. I. *Rhizoctonia Solani* Kuehn. Stem-rot; potato-rot; potato collar-fungus; black speck; rhizoctonia rot.

The mycelium of this fungus attacks the stems at or immediately above ground-level, and is also the cause of a rotting of the tubers. Its presence on tubers can usually be determined by the presence of minute black sclerotia.

113. **Dry-rot,** *Fusarium oxysporum* Schlecht.

V. *Fusarium Solani* Sacc. Brown ring.

Considerable confusion exists in mycological literature as to the organism causing dry-rot; as the New Zealand form agrees with the description of *F. oxysporum* it is placed provisionally under this species. This fungus is the cause of a common dry-rot of stored tubers.

(56.) **Early Blight,** *Alternaria Solani* (Ell. et Mart.) Jones et Grout.

(See also under "Tomatoes.")

This disease is common in certain seasons on tomatoes and potatoes.

(58.) **Late Blight,** *Phytophthora infestans* (Mont.) de Bary.

(See also under "Tomatoes.")

114. **Mattery Eye,** *Bacillus solanacearum* E. F. Sm.

Gravy eye; wet rot; sore eyes; bacteriosus.

This is a bacterial disease of the tubers, stems, and leaves. Its presence may usually be determined by the discoloration of the conduction-vessels in the stem and rotting of the tubers.

115. **Phoma Rot,** *Phoma tuberosa* Mel., Ros. et Sch.

This fungus is a wound parasite of the tuber. It is an uncommon disease.

116. **Powdery Scab,** *Spongospora subterranea* (Wallr.) Johnson.

V. *Erysibe subterranea* Wallr. V. *Tuburcinia scabies* Berk. V. *Sorosporium scabies* (Berk.) F. v. W. III. *Spongospora Solani* Brunch. III. *Spongospora scabies* Mass. Corky scab; corky end; potato-canker.

This organism causes small, more or less circular, scabbed areas on the tubers These areas, when mature, contain powdery masses of the spore-balls.

(63.) **Sclerotinia Disease,** *Sclerotinia Libertiana* Fcl.

(See also under "Artichokes.")

117. **Silver Scurf,** *Spondylocladium atrovirens* Harz.

I. *Phellomyces sclerotiophorus* Frank. Dry scab; scurf.

This fungus forms small discoloured scabbed areas on the surface of the tuber.

(3.) Rape, Swedes, and Turnips.

(71.) **Cabbage-mildew,** *Peronospora parasitica* (Pers.) de Bary.

(See under "Cabbages.")

(72.) **Club-root,** *Plasmodiophora Brassicae* Wor.

(See under "Cabbages.")

118. **Dry-rot,** *Phoma Napo-brassicae* Rostr.

This fungus causes a destructive bulb dry-rot of turnips, particularly swedes.

(85.) **Pea-mildew,** *Erysiphe Polygoni* DC.

(See under "Peas.")

(74.) **White Rust,** *Crystopus candidus* (Pers.) Lev.

(See under "Cabbages.")

Establishing Prairie-grass.—Paddocks of prairie-grass are rather hard to establish, and sometimes turn out a failure through a thin strike of the grass and subsequent injudicious stocking. In laying down the pasture sow a mixture of 75 lb. of prairie-grass and 6 lb. of red clover to the acre. The seed is difficult to drill, and should be broadcasted and disked in. It should be sown in February or March, and only lightly stocked with cattle till about November, when a cut of hay could be taken. After that it should be only lightly stocked, and mainly used for cutting green feed and hay. By the time the clover dies out there should be a good thick pasture of prairie-grass.—*Agricultural Instruction Branch.*

Removing Wool from Sheep-skins.—The substances used for this purpose are sulphide of sodium and slaked lime in equal parts. The quantities of the mixture to be used for each 100 skins of the respective classes are as follows: For thick green skins, 22 lb.; thick dry soaked skins, 12 lb.; thin green skins, 16 lb.; thin dry soaked skins, 10 lb.; green lamb-skins, 7½ lb.; dry lamb-skins, 6 lb. Sufficient water is added to the mixture to bring it to a thin paste. It is then applied to the fleshy surface with a brush, and the skin folded on the same surface. After twenty-four hours the wool can be removed. Strong leather gloves should be worn, as the mixture is very caustic and would otherwise injure the hands.—*Live-stock Division.*

TESTING OF PUREBRED DAIRY COWS.

JANUARY CERTIFICATE-OF-RECORD LISTS.

THE appended lists, comprising the records of cows which received certificates during the month of January, 1922, are supplied by the Director of the Dairy Division, Mr. W. M. Singleton :—

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	FRIESIANS.					
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Coldstream Magpie Domino	Marchant and Sons, Cardiff	1 347	240·5	365	13,349·30	586·27
Rosevale Sylvia Colantha	North and Sons, Omimi	2 72	247·7	365	16,633·00	561·87
Coldstream Colantha Princess	Marchant and Sons, Cardiff	1 334	240·5	365	15,958·10	509·19
Coldstream Princess Inka Pietertje	Marchant and Sons, Cardiff	2 68	247·3	365	13,122·80	423·33
Dominion Edingcrest	Central Development Farm, Weraroa	2 154	255·9	365	12,271·55	411·48
Rosevale Daisy Posch	North and Sons, Omimi	2 58	246·3	365	9,315·70	395·87
Black Duchess ..	D. Ross, Hairini ..	1 249	240·5	333	11,661·70	387·82
Fobes Jessie Segis of Oakview	H. R. Green, Kairanga	2 33	243·8	315	9,693·25	378·19
Rosevale Bertha Posch	North and Sons, Omimi	2 2	240·7	365	11,086·90	358·54
Friens Mercedes Pearl	D. Dickie, Wellington	2 144	254·9	304	8,304·00	311·27
Kainga Pai Mooie Blanco Rosa	J. Liggins, Tokomaru	2 29	243·4	273	6,900·40	265·15
Dominion Lady Olga	Central Development Farm, Weraroa	2 54	245·9	280	6,788·60	246·02
Senior Two-year-old.						
Te Ngutu Princess Ena	D. Ross, Hairini ..	2 347	275·2	362	14,546·00	505·93
Dominion Jessie Beets	Central Development Farm, Weraroa	2 310	271·5	365	13,341·60	457·39
Dominion Corona ..	Central Development Farm, Weraroa	2 278	268·3	365	11,815·20	426·68
Dominion Wood Violet	Central Development Farm, Weraroa	2 319	272·4	365	10,671·05	423·23
Medbury Woodcrest Domino Maid	H. Johnson, Stratford	2 267	267·2	357	9,814·00	406·56
Friesland Cadilac ..	W. McKenzie, Palmerston North	2 250	265·6	361	9,907·00	403·85
Dominion Coringa de Kol	Central Development Farm, Weraroa	2 342	274·7	314	10,633·55	378·49
Dominion Manola II	Central Development Farm, Weraroa	2 326	273·1	330	10,344·50	351·80
Ashlea Renown ..	J. Liggins, Tokomaru	2 306	271·1	206	8,337·70	319·75
Princess Van Kroons	J. Liggins, Tokomaru	2 249	265·4	203	9,373·90	307·72
Junior Three-year-old.						
Rosevale Queen Daphne	North and Sons, Omimi	3 136	290·6	365	17,956·50	675·18
Woodcrest Netherland Pauline	W. D. Hunt, Waikiwi	3 98	286·8	365	17,997·90	602·09
Te Aroha Tulip ..	F. O. Stack, Kiwitea ..	3 47	281·7	365	11,821·20	515·77

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	FRIESIANS—*continued.*					
Junior Three-year-old —continued.		Yrs. dys.	lb.		lb.	lb.
Lakeview Rosa Belle Fobes	Bloomfield Farm Company, Wellington	3 112	288·2	326	10,268·30	382·43
Johanna Lass of Te Aroha	F. O. Stack, Kiwitea..	3 68	283·8	319	9,401·80	369·72
Laura Woodlands ..	A. B. Walker, Ohangai	3 72	284·2	340	10,808·40	325·85
Senior Three-year-old.						
Bainfield No. 19 ..	W. D. Hunt, Waikiwi	3 302	307·2	365	14,965·10	517·72
Dominion Doreen II	Central Development Farm, Weraroa	3 292	306·2	305	13,331·55	485·51
Dominion Jocrest ..	Central Development Farm, Weraroa	3 306	307·6	350	13,368·10	440·93
Junior Four-year-old.						
Viola Beauty Burke	A. B. Walker, Ohangai	4 127	326·2	303	12,175·90	389·36
Ashlea Melody ..	J. Liggins, Tokomaru	4 1	313·6	228	9,660·00	340·10
Senior Four-year-old.						
Dominion Beauty ..	Central Development Farm, Weraroa	4 352	348·7	365	14,829·70	500·25
Mature.						
Dominion Pauline ..	Central Development Farm, Weraroa	6 285	350·0	365	15,788·35	488·38
Holland Queen II ..	North and Sons, Omimi	8 260	350·0	319	11,202·00	411·41
Dominion Lady Tromp	Central Development Farm, Weraroa	5 353	350·0	333	12,096·05	410·87
Dutch Molly ..	Voss Bros., Longburn	8 44	350·0	365	11,955·70	402·33
Ashlea Inka Josie ..	H. Johnson, Stratford	7 280	350·0	365	11,402·50	401·11
Cordyline Eve ..	C. E. Robertson, Palmerston North	6 265	350·0	282	12,476·80	397·10
Ashlea Mercena Rag Apple	J. Liggins, Tokomaru	6 18	350·0	241	10,151·40	374·36
	JERSEYS.					
Junior Two-year-old.						
Avoca's Belle ..	J. G. Stronge, Westown	1 363	240·5	365	8,441·65	421·44
Waipiko Molly ..	C. G. C. Dermer, Waipiko	2 59	246·4	365	7,454·00	405·60
Meadowvale Ornament	E. O'Sullivan and Sons, Tariki	1 344	240·5	365	6,183·70	401·02
Woodstock's Spright	Mrs. Banks and Son, Kiwitea	1 254	240·5	365	8,030·80	400·15
Woodstock's Zorada	Mrs. Banks and Son, Kiwitea	1 320	240·5	365	7,354·10	396·94
Koro Koro's Banksia Rose	R. W. Southee, Kiwitea	1 307	240·5	365	7,459·50	380·23
Woodstock's Cynthia	Mrs. Banks and Son, Kiwitea	1 360	240·5	365	7,259·40	353·67
Middlewood's Pet ..	D. H. Kilgour, Kiwitea	2 32	243·7	354	6,012·70	349·31
Woodstock's Fay ..	Mrs. Bank and Son, Kiwitea	2 14	241·9	365	6,898·70	344·25
Dominion Golden Eyes	Ruakura Farm of Instruction, Hamilton	1 326	240·5	365	5,380·20	340·52
Dominion Goldfinder	Ruakura Farm of Instruction, Hamilton	1 362	240·5	365	5,927·00	338·91
Kudos Violet ..	E. Harding, Woodville	1 252	240·5	365	5,075·80	317·49
Oakvale's Lily ..	D. H. Kilgour, Kiwitea	2 27	243·2	340	5,675·30	309·98

PONTIAC PRINCESS (MARCHANT AND SONS).
C.O.R.: 5 years 335 days; in 365 days, 20,843·4 lb. milk, 831·10 lb. butterfat.

JESSICA'S MAID (MUGGERIDGE BROS.)
C.O.R.: 7 years 337 days; in 365 days, 11,065·1 lb. milk, 679·30 lb. butterfat.

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days	Milk.	Fat.
Junior Two-year-old —continued.	JERSEYS —*continued.*	Yrs. dys.	lb.		lb.	lb.
Koro Koro's Golden Gem	R. W. Southee, Kiwitea	2 41	244·6	365	6,430·50	308·51
Koro Koro's Duchess	R. W. Southee, Kiwitea	2 9	241·4	365	6,171·70	306·25
Middlewood's Nancy	V. T. Dimock, Kaponga	1 299	240·5	339	5,286·60	300·64
Verbena's Belle ..	A. Mouldey, Tirau ..	2 76	248·1	317	4,748·00	277·26
Koro Koro's Waif ..	R. W. Southee, Kiwitea	1 348	240·5	365	4,400·80	266·08
Connie Brighteyes ..	E. S. Holdaway, Ballance	2 15	242·0	271	4,482·30	258·18
Koro Koro's Dusky Maid	R. W. Southee, Kiwitea	1 331	240·5	365	5,045·00	246·50
Koro Koro's Queenie	R. W. Southee, Kiwitea	1 349	240·5	291	4,573·40	244·90
Dominion Gold Dust	Ruakura Farm of Instruction, Hamilton	2 5	241·0	365	4,227·00	243·70
Princess Ruth ..	J. S. Rae, Taneatua..	1 347	240·5	277	5,012·60	241·55
Senior Two-year-old.						
Springbank Twist ..	E. S. Holdaway, Ballance	2 320	272·5	322	5,570·40	351·20
Rainsbrook Claret Cup	T. Portis, Ardgowan..	2 290	269·5	202	5,099·70	283·68
Three-year-old.						
Eunice of O.K. ..	E. O'Sullivan and Sons, Tariki	3 37	280·7	365	10,167·20	599·20
Charm's Lord's Fancy	G. Buchanan, Paeroa	3 126	289·6	365	10,344·00	548·71
Charm's Silverine ..	G. Buchanan, Paeroa	3 219	298·9	365	8,816·60	546·62
Wildbird of Woodstock	Mrs. Banks and Son, Kiwitea	3 321	309·1	365	8,259·40	455·04
Hope's Girl ..	C. Ward, Hairini ..	3 11	278·1	365	7,195·50	386·49
Ballance Princess ..	E. S. Holdaway, Ballance	3 139	290·9	344	6,514·60	318·79
Jersey Corner Reka..	H. V. Holdaway, Ballance	3 359	312·9	281	6,013·60	314·85
Good Enough ..	E. S. Holdaway, Ballance	3 234	300·4	309	4,810·60	305·62
Fox's Dawn's Jewel	H.R.Benbow, Ormondville	3 16	278·6	316	5,342·90	282·22
Four-year-old.						
Baby Bunting of Woodstock	Mrs. Banks and Son, Kiwitea	4 103	323·8	365	8,737·40	480·37
Woodstock's Eminence	Mrs. Banks and Son, Kiwitea	4 216	335·1	365	8,409·30	429·15
Heartsease of Sherwood	M. Crimmins, Waikino	4 237	337·2	365	6,565·50	391·69
Mature.						
Grannie's Nancy ..	C. Wells, Warea ..	8 44	350·0	365	12,088·25	647·39
Waipiko Christina ..	L. M. Barriball, Waiuku	5 312	350·0	365	9,513·10	596·93
Mountain View's Blossom	H. C. Sampson, New Plymouth	6 51	350·0	364	8,474·00	488·70
Mountain View's Polly	J. R. Colson, Waihou	5 2	350·0	365	9,656·40	476·56
Wavelet	A. and J. O'Donnell, Inaha	5 344	350·0	341	8,227·80	465·37
Rewa Alsike ..	J. H. Sherard, Otaua	10 115	350·0	365	7,936·20	456·54
Brown Bessie ..	F. E. Day, Tamahere	7 287	350·0	365	7,988·10	448·12
Silence	A. and J. O'Donnell, Inaha.	5 267	350·0	337	7,773·30	385·19
Blacksmith's Hope ..	E. S. Holdaway, Ballance	5 6	350·0	303	7,414·30	380·31

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at starting Test.	Fat req'd. for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS—*continued.*					
Mature—continued.		Yrs. dys.	lb.		lb.	lb.
Soprano	E. S. Holdaway, Ballance	5 277	350·0	343	6,960·60	370·53
Mermaid's Abundance	H. Purdie, Waitara ..	7 49	350·0	264	7,365·60	367·10
Ivondale's Carnation Queen	P. J. Petersen, Waitara	5 355	350·0	304	6,848·60	357·82
	AYRSHIRES.					
Two-year-old.						
Dominion Parkhead Girl	Moumahaki Experimental Farm, Waverley	2 311	271·6	323	9,152·40	356·77
Dominion Cherry's Bloom	Moumahaki Experimental Farm, Waverley	2 326	273·1	334	8,723·30	331·71
Four-year-old.						
Greenfield's Mary ..	C. E. C. Webb, Koputaroa	4 282	341·7	365	8,734·10	371·43
Dominion Newton Gem	Moumahaki Experimental Farm, Waverley	4 42	317·7	264	9,266·40	332·11
Mature.						
Dominion Newton Gipsy	Moumahaki Experimental Farm, Waverley	8 73	350·0	295	11,009·80	429·21
Darkie of Townhead	A. Galt, West Plains..	5 363	350·0	342	10,171·50	397·90
Greenfield's Heather Queen	C. E. C. Webb, Koputaroa	7 128	350·0	365	8,662·30	382·23
Birchwood Beauty I	A. Galt, West Plains..	5 246	350·0	365	8,757·25	372·06
Dominion Cherry I ..	Moumahaki Experimental Farm, Waverley	5 123	350·0	262	9,009·20	365·96
	MILKING SHORTHORNS.					
Junior Two-year-old.						
Matangi Pauline ..	Ranstead Bros., Matangi	2 68	247·3	365	6,252·00	293·84
Senior Two-year-old.						
Cloverlea Dairymaid I	D. Buick, Palmerston North	2 353	275·8	365	7,676·40	329·46
Senior Three-year-old.						
Cloverlea Fairy I ..	D. Buick, Palmerston North	3 361	313·1	327	9,459·00	381·85
Mature.						
Sweet Garnett of Cornwall Park	J. L. Turnbull, Christchurch	..	350·0	365	17,015·25	575·33
Newstead Molly ..	S. Lye, Newstead ..	..	350·0	365	13,375·90	529·16
Lady Cornwall of Cornwall Park	J. L. Turnbull, Christchurch	..	350·0	301	14,798·00	497·25
Newstead Tulip ..	S. Lye, Newstead ..	..	350·0	365	10,080·20	454·07
Meg of Dungiven ..	J. L. Turnbull, Christchurch	..	350·0	365	11,853·25	445·85
Newstead Roany ..	S. Lye, Newstead ..	..	350·0	360	10,816·10	442·59
Ingleburn Gem ..	S. Lye, Newstead ..	..	350·0	365	11,310·40	408·01
Vale Royal Princess	J. L. Turnbull, Christchurch	..	350·0	365	8,842·03	394·35
Bushby Park Daisy	Ranstead Bros., Matangi	..	350·0	265	8,131·20	375·22
Braeburn Mabel ..	S. Lye, Newstead ..	..	350·0	365	8,942·30	358·30

WORK FOR THE COMING MONTH.

THE ORCHARD.

BRANDING OF EXPORT FRUIT-CASES.

In order to simplify the marking of cases for export, and to expedite delivery to the various consignees at ports of discharge, a systematic form of branding is desirable. It has been suggested by those handling fruit at the British ports that the shipping-mark should consist of the initial letters of the consignee's name over a letter signifying the destination of the consignment. For instance, all fruit consigned to Richard Smith, of London, would carry the shipping-mark "R.S." over "L" in large letters. This should be applied to both ends of the cases, in order that the marks may be easily discerned without unnecessary handling of the fruit. To enable this to be done it would be necessary to leave a space on the registered export brand (stencil or label), in which the shipping-mark would be inserted. As a large number of exporters have their labels in stock for the present season it would not be expedient to enforce this method of branding at once, thereby entailing a good deal of waste through discarding these labels, but provision should be made for an alteration along the lines suggested before further supplies of labels are ordered.

An alternative means of showing the shipping-mark on both ends of the case would be for the packing-shed or orchard brand to be also used as the shipping-mark. Thus "Raroa," registered as the packing-brand, would also constitute the shipping-mark, and should be stencilled on the reverse end with the essential particulars. No other shipping-mark would then be necessary. The particulars required to be shown on both ends of the case are the registered number of the packer, name of the variety of fruit, grade-mark of the fruit, and the number of fruit in the case. These particulars should be clearly marked in relative position on every case. Thus it would considerably simplify the sorting of varieties to know that the name of the variety was to be found on the lower left-hand side of every label and brand. This would necessitate slight modifications in some of the designs at present in use.

It is hoped, therefore, that in the case of labels and brands which do not at present conform to one of these systems the necessary alterations will be made when the present stocks on hand are used up and fresh ones being obtained. With this object in view, labels, &c., submitted for registration are being approved for this season only, and before ordering further supplies samples embodying the suggested alterations should be submitted for approval and registration.

STANDARD FRUIT-CASES FOR THE LOCAL MARKET.

It has been brought under the notice of this Division that some growers are ordering for this season's fruit new cases which do not conform to the standard sizes designated in the regulations relating to the sale, for consumption within the Dominion, of New-Zealand-grown fruit. At the special request of the fruitgrowers assembled in conference permission has been given for an extension of time until 31st October next to allow of stocks of cases which may not conform to the requirements of the regulations being used up. It is not desirable, however, that growers should order new cases of these sizes, because any left on hand after the expiry of the date mentioned cannot be placed on the market, it being the intention of the Department to enforce the regulations in this respect after 31st October.

—W. T Goodwin, Assistant Director of the Horticulture Division.

AUCKLAND.

The principal work for the month is the picking and marketing of the fruit crops. Many growers are still placing their number on the cases with pencil. It is well to note that this must be done with a rubber stamp or stencil. The end of the case is the proper place for the number.

Spraying, however, should not be neglected, particularly in the case of pip-fruits, this being necessary to control the later broods of codlin-moth, and also leaf-roller. The formulas and strengths recommended last month still apply. If these later sprayings are neglected, trouble is almost sure to follow, and the value of all previous work is destroyed. The spraying of citrus-fruits should not be neglected, especially where there have been attacks of verrucosis or grey scab. Use bordeaux, 4–4–40, and repeat if necessary.

This is a suitable time to carry out budding operations. Select buds from trees that are hardy and also consistent in their cropping-qualities. Conditions are now favourable for the sowing of a cover-crop, especially where the soil is lacking in humus. All fruit-trees will benefit considerably where this is carried out each year. —*L. Paynter, Orchard Instructor, Hamilton.*

HAWKE'S BAY.

The chief work in March will be the harvesting of crops and spraying. Spraying with arsenate of lead, ¾ lb. of powder or 1½ lb. paste to 50 gallons of water, will be necessary on all pip-fruit trees from which the crop has not been picked, as a control of codlin-moth and leaf-roller. For woolly aphis, Black Leaf 40, 1 pint to 80 gallons, should be applied with the arsenate spray, though oil, 1–80, may be used as soon as the crop is picked. There is usually a prolific brood of aphis in the autumn, but this can be dealt with very satisfactorily with oil at a strength of 1–80.

Stone-fruit trees carrying a crop should be sprayed with lime-sulphur, 1–120, plus 4 lb. of atomic sulphur, if brown-rot is feared. This may be applied right up to picking-time, and if a fine nozzle is used the fruit will not be stained to any extent. Stone-fruit trees from which the fruit has been picked may be sprayed with bordeaux, 3–4–50, for rust, shot-hole, and other fungoid diseases.

Continue cultivation where possible, or run the mower over weeds which have got ahead. —*W. H. Rice, Orchard Instructor, Hastings.*

NELSON.

By the time these notes appear the early sorts of apples—Cox's Orange, Gravenstein, Golden Pippin, Scarlet Pearmain, and Alfriston—will be shipped. During the short interval that follows, pack any apples that have to go into cool store and get the cull fruit out of the way. The box timber this year is of good quality, but packers are warned that many of the cases in stock are not up to specification; they should be carefully inspected before packing. Pears are usually shipped by the early March boat. Special care is needed to pick this class of fruit at the right stage of maturity, and the practice has been to leave it too long on the trees. Growers are recommended to pick at the first sign of maturity, which is usually when the pears part from the spur quite readily.

Orchard cultivation should now be discontinued. If it is desirable to drill in a cover-crop, oats with vetches, beans, or peas may be sown now.

Growers in districts where pear-midge is troublesome should carefully inspect their pear-trees at short intervals, removing and burning all infected foliage. At short intervals, too, all fruit infected with codlin-moth or brown-rot should be gathered and destroyed. There is now some danger to the late fruit from black-spot and leaf-roller; to prevent this an application of lime-sulphur and arsenate of lead is recommended. As the different kinds and varieties of fruit are gathered give close attention to the trees, and spray them when necessary for woolly aphis, red mite, and fungus growth. Splendid work has been done of late years at this season with red-oil sprays at 1–60 for insects, and bordeaux or lime-sulphur for fungus diseases. —*W. C. Hyde, Orchard Instructor, Nelson.*

CANTERBURY.

Spraying measures for the month will be as follows: Pip-fruits—For leaf-roller caterpillar and a probable late infection of codlin-moth spray the trees again with arsenate of lead. Pick and destroy immediately all moth-infected fruits. For woolly aphis give affected trees a thorough application of Black Leaf 40, 1–800, driving the spray well into the colonies. If red-mite is present spray again with lime-sulphur, 1–120, or with Black Leaf 40, 1–800. For powdery mildew cut off all infected twigs and spray thoroughly with sulphur-atoms, 1 lb. to 9 gallons, or atomic sulphur, 8 lb. to 100 gallons of water. Lime-sulphur, 1–120, may also be used. Stone-fruits—To control the larvæ of the longicorn beetle pick off and burn all dead and dying twigs on plum-trees. Stone-fruit trees affected by any fungus should be sprayed with bordeaux, 3–4–50, after the fruit is gathered.

Brown-rot-infected fruits should be gathered up and destroyed, and not allowed to lie on the ground.

Mid-season and late varieties of fruit intended for storage must be picked as soon as mature, but before complete ripeness. Damaged fruit will not keep in storage. The greatest care must be given to grading and packing, the chief points being size, colour, freedom from disease, and uniformity throughout the case. Read carefully the Dominion fruit-marketing regulations.

Intending planters should now order trees as soon as possible. When ordering later there is a risk of the varieties required being sold out. Those who intend planting an orchard in the autumn should see to the clearing of the land, ploughing, and subsoiling as soon as possible.

Orchardists intending to sow cover-crops for ploughing in in the spring are reminded that the early part of March is a suitable time for sowing. Before starting with the picking and marketing of mid-season fruit, growers should, where possible, go over the orchard again with the scarifier to stir up the soil. Budding may be done until the early part of March, while the sap is well up. Remove from the roots and trunks of trees all superfluous shoots, so as to conserve the energy of the trees for maturing buds and wood-growth.

—W. K. Dallas, Orchard Instructor, Christchurch.

OTAGO.

As there is a quantity of stone-fruit coming forward affected with brown-rot, growers are advised to spray with atomic sulphur, 8 lb. to 10 lb. per 100 gallons of water. Continue to spray for this disease until a few days before picking, as when the fruit is packed on the railway-trucks in large stacks it gets overheated, and creates conditions of temperature and moisture suitable for the spread of the trouble. If the fruit is covered with a fungicide this will help to control the spread of brown-rot after the fruit is packed in boxes. Even if the fruit is marked with spray-stains, that condition is preferable to it arriving at its destination running out of the cases and absolutely worthless.

Continue the application of atomic sulphur, 8 lb. to 10 lb. per 100 gallons of water, for powdery mildew on apple-trees. Where any of the aphides are present use Black Leaf 40, 1–800. As there is a considerable amount of codlin-moth and leaf-roller caterpillar this season, growers are advised, not only in their own interest but in compliance with the Orchard and Garden Diseases Act, to pick and effectively destroy all infected fruit. Also periodically apply to the rapidly growing fruit a protective covering of arsenate of lead, 3 lb. paste or 1½ lb. powder to 100 gallons of water. This can be applied as a combined spray with Black Leaf 40 or atomic sulphur. When using a combined spray it will be found advisable to add 3 lb. of unslaked lime to prevent scorching of foliage and fruit. Where red mite is in evidence, spray with atomic sulphur, 8 lb. to 10 lb. per 100 gallons water, or Black Leaf 40, 1–800. When spraying for this pest every care must be taken to thoroughly spray the under-side of the leaves.

—B. G. Goodwin, Orchard Instructor, Dunedin.

VITICULTURE.

J. C. WOODFIN, Vine and Wine Instructor.

VINEYARD AND CELLAR.

The climatic conditions up to the time of writing in February have not been suitable for the production of a perfect vintage. There has been considerable non-setting and millerandage due to continuous rain and damp weather during the flowering-period. Black-spot has also been unusually prevalent, and has damaged and reduced the grape crop considerably. In some districts the "grape-worm" has been very destructive. This caterpillar not only causes harm by sucking the juice from the grapes, but, leaving a hole in the berry, allows the rot to enter, and, moving as it does from berry to berry, eventually causes the loss of part or the whole of the bunch. The damage done is greater in damp weather, which contributes to the rapid development of the rot. Most vineyards have been fairly free from mildew notwithstanding the apparently favourable conditions for the germination of its spores. There is a possibility of these conditions continuing and resulting in a large proportion of the vintage being spoiled by mould or disease.

The damaged grapes which have dried up will be thrown out of the mill by the stripper, or can be sorted out by hand. It is, however, impracticable in wet seasons to sort out all the mouldy and partly rotted grapes, and this is not necessary for the manufacture of a marketable wine. If the must from such grapes is allowed to ferment in the ordinary manner the resulting wine will be affected in both flavour and odour, and will probably "break." The effects of decay in the grapes manifest themselves only a certain time after the transfer of the wine from the fermentation vats, generally when it is exposed to the air during the racking. It may then show signs of "brown break," which is recognized by a cloudy appearance and a characteristic yellowish-brown deposit, and have also a disagreeable flavour.

The liability of wines breaking can be ascertained by exposing the suspected new wine in a glass to the air for three days. If the wine remains clear it is not liable to break; if, on the contrary, it becomes cloudy—developing a chocolate colour with an iridescent surface having an oily appearance—it will be liable to change when withdrawn from the vat. This tendency will disappear on the addition of from 1 oz. to 3 oz. of metabisulphite of potassium. It is, however, preferable to make use of the properties of sulphurous acid—which is the active part of the metabisulphite—by adding it to the must before and during fermentation. This can be done in the following manner: The grapes are gathered as usual, including the partially decayed and mouldy berries; they are crushed, and ½ oz. of metabisulphite added to each 100 gallons of must. Fermentation, if the weather is cool, may be slow in starting, and may require some assistance. This can be arrived at by heating a part of the must and mixing it with the remainder, when fermentation will probably start spontaneously. A more certain method, however, is to use a starter prepared from a few healthy grapes gathered beforehand and fermented under favourable conditions. When fermentation has started, another ½ oz. of metabisulphite per 100 gallons, dissolved in water or in some of the must, can be added when pressing down the cap, mixing it thoroughly with the must. Further like amounts can be added each time the cap is pressed under, until the taste of decay disappears. The amount employed may vary from 1½ oz. to 3 oz. per 100 gallons. No more than is absolutely necessary should be employed, as the sulphite has a tendency to fix acidity, and New Zealand grapes usually contain more than their share of this.

Where grapes have been attacked by the grape-worm, besides the taste due to rot, other flavours are present due to the excrements of the worms, rendering it necessary to eliminate the affected berries before crushing.

POULTRY-KEEPING.

F. C. BROWN, Chief Poultry Instructor.

CULLING, AND SELECTION OF THE BREEDING-BIRDS.

THE work during next month demands that the poultry-keeper shall tax his powers of observation to the utmost in all things pertaining to the stock and plant if a maximum of profit over cost of production is to be secured in the future. In the first place, it is essential to weed out all birds that are not paying or likely to pay their way. Especially will money be lost by holding on to cockerels that have reached the age of from four and a half to five months. It is at this stage that they are most desired for a high-class table trade, and when the highest prices are obtainable. Of course, if such prices are to be secured the birds must be "done well" from the start.

In addition to marketing all surplus cockerels heavy culling should be carried out in the adult female flock. The current prices of foodstuffs make it imperative that no sentiment be allowed to enter in distinguishing between the birds likely to show a profit during the coming year and those that will not. In this connection there are few birds in any flock that will pay to keep for a third season, unless, of course, they have been noted layers and are required for the breeding-pen. One great weakness in holding on to old hens is that they can seldom be depended upon to lay before the late winter or early spring, just when eggs are cheapening. The question is whether it pays to feed these birds for five or six months at the food-prices now ruling. Obviously such stock must mean a constant drain on the profits of the pullets during the dear-egg season. As to the hens that are now

finishing up their first laying season, these should be carefully gone through in order to detect the weak hens and to discover the ideal birds for the breeding-pen. It should be remembered, however, that it will be too late to carry out this important work with any degree of certainty after the moulting process has set in. In the case of first-season birds the culling may be only light, but with most flocks in this country at least one-third of the birds can be culled out to advantage. The day for keeping all birds till they are past their second season of production is past.

To the novice who has not studied laying-form the following points may serve as useful indications of poor laying-power at this time of the year: Early moulting; overfatness (above the normal weight of the bird); indications of weak constitution, such as dull, sunken eyes, loose feathering, and sluggish appearance; well-kept plumage; lack of abdominal development; and anything denoting unhealthy condition. In addition, the poor layer will be undergoing the moulting process, a condition in which few birds in any flock continue to lay. Thus the fact of birds taking a rest now goes to show that the egg-laying power is not what it should be, providing, of course, that they (the early moulters) have been hatched about the same time of year, and have been fed and managed in a similar manner to the late moulters which are now in profit. For further points to be observed in distinguishing between the good and bad layer readers are referred to my notes in the last December number of the *Journal*.

In choosing the best hens to breed from it is the long-season layers, or, in other words, the late moulters that are most desired, for the reason that if a bird is to produce an exceptionally high egg-yield she must necessarily be a long-season layer, and to be this she must also be a late moulter, for it cannot be expected, except in very isolated cases, that a bird will renew its feathers and continue laying at the same time. While lateness in moulting is undoubtedly one of the very best indications of productive power, it is not to be implied that the late moulter and the heaviest layer is necessarily an ideal breeding-bird. By all means breed from the best layer, but only if other essential qualities are possessed as well. True, the heavy layer and late moulter will generally possess a strong constitution, which is a great factor in the building-up or the maintenance of a heavy-laying flock; but something more is required if the progeny are to possess good-sized bodies, and are to be depended upon to produce high-grade marketable eggs. Furthermore, the ideal breeding-hen should conform to the utility-standard weight requirements —that is, it should be a slightly larger specimen than the average bird kept in a laying flock—while the question of breeding type must not be overlooked. Of course, where heavy egg-production is the sole aim essential points to this end, such as constitutional vigour, should not be sacrificed to maintain some minor breed-quality. Nevertheless, all other things being equal, the specimen that conforms nearest to breed type and other general characteristics in accordance with the utility-standard requirements is always to be preferred. Be it ever remembered that once these are seriously departed from the strain will soon revert to mongrel, and consequently a reduced egg-yield will be the result. Breeding from standard-bred stock of fixed type, possessing sound constitution and, if possible, the individual egg-record in addition, are the great essentials for raising profitable stock.

Having selected and carefully marked the most desirable breeding-hens for next season, it is not wise to force their production and get every possible egg out of them. It is not uncommon to find the late moulter laying up till April and even May, but rather than allow this I believe in checking production — this in order that the birds may come to the breeding season with as much as possible of the vigour necessary for the production of healthy stock. Where possible the birds should be given a good range, and with a light but nourishing diet they will have an opportunity of recouping and coming to a condition to produce eggs containing strong germs when the breeding season comes round. Some of the finest chickens that came under my notice last season were the progeny of hens that were provided with a whole-grain ration immediately they finished moulting and during the whole time they were mated. In addition they were given an ample supply of green food, while they were prevented from becoming overfat by being compelled to scratch in deep litter for the grain food supplied. No bird that is carrying a surplus of fat should enter a breeding-pen, or trouble may be expected in rearing the chickens.

It is frequently stated that breeding for increased egg-production from generation to generation is fast bringing about a reduced size of bird and smaller eggs, also that each year a greater difficulty is being experienced in the hatching and

rearing of chickens from this cause. There is no doubt much truth in this contention, especially in cases where the birds are bred from merely because they happen to be the best layers but have practically nothing else to recommend them from a breeding viewpoint. Nevertheless, it is probable that more harm is done in this direction by forcing the breeding-hens for eggs just before and during the time eggs are being produced for reproductive purposes than from any other cause.

Given an early hatched, well-developed pullet, possessing a maximum of constitutional vigour, there is no special reason why it should not be fed and tested (in reason) as regards its egg-yielding capacity during the first laying season without unduly weakening its breeding-powers. Then with proper subsequent care it can be placed in the breeding-pen the following season, and can be depended upon to produce desirable progeny. It is never advisable to breed from pullets if hens can be obtained, chiefly for the reason that on appearance a pullet may look a most desirable breeding-bird, but would never be considered such after being subjected to the test of a season's laying. Thus, where the good-looking pullet is bred from which later proves a weak specimen it is quite possible that the progeny will be half-grown before it is discovered that they have been bred from a weakened parent. I realize that it is not always possible to avoid breeding from pullets, especially when very early hatched chickens are required. It is one of the things in which local conditions must be taken into account. For instance, it would be sounder practice to breed from a good pullet than from an inferior hen.

CARE OF THE PULLETS.

It should be needless to remind readers that the season for dear eggs is near at hand, and that the pullets must be chiefly depended upon to produce these. This emphasizes the importance of giving them the very best of care and attention. It cannot be expected that pullets will lay well in cold weather unless they have everything in their favour. There must be no delay in placing them in their winter quarters. These should be roomy, well-ventilated, but without draughts, and maintained in such a clean state that no vermin is allowed to live. Remember that the presence of insect pests means weakened stock and, consequently, poor egg-returns. Never allow the birds to wait about in the yard on a cold wet day for feeding-time. Feed them in the house at all times, throwing the evening grain into the litter. Sufficient grain should be given for them to scratch for in the early morning, and thus obtain the necessary exercise so essential for good health and an increased egg-yield. See that there are no sharp changes in the system of feeding or handling. In fact, there should be as little change in the diet as possible. The slightest change of food or quarters is apt to bring on an early moult at the expense of the winter-egg production. In this connection poultry-keepers who have a supply of last season's wheat would be well advised to reserve this as far as possible for the pullets coming on to lay, otherwise the change from old to new wheat is apt to bring on an undesirable moult.

BRONZE-WING TURKEYS.

Inquiries are frequently received as to where bronze-wing turkeys may be procured. I should be pleased if breeders who have such birds for disposal would kindly forward me their names and addresses for reference purposes.

THE APIARY.

F. A. JACOBSEN, Apiary Instructor.

By the time these notes appear the season will be far advanced. Extracting the crop and removing the comb honey will be the work on hand. Before taking the last of the surplus honey a careful examination of the colony must be made in order to ascertain the amount of stores available for wintering the bees. It does not pay to extract too closely, and many beekeepers err by leaving insufficient stores, causing whole or partial starvation. Even if observed in time the additional work of feeding during the winter or early spring is necessary. It takes 30 lb. of honey to winter a normal colony successfully, particularly in the South, and if this is increased to 40 lb. there will be no danger of starvation, while a solid foundation will have been laid for the following season's crop.

REMOVING HONEY FROM THE HIVE.

Occasionally, through unforeseen circumstances, the removal of the surplus honey is delayed until the close of the nectar-flow. Great caution must then be used in manipulating the colonies. The combs should be removed as quickly as possible, and care taken not to incite the bees to rob by keeping the hive open too long. The brood-chamber requires to be examined to ascertain the quantity of winter stores. Should there be an insufficient supply, the empty combs must be removed and sealed ones substituted, placing them as near to the sides of the hive as space will permit. It is advantageous to take no honey from the brood-chamber unless absolutely necessary. Do not leave combs of honey lying about, or expose vessels that have contained honey. Details of this kind must be attended to, otherwise robbing on a wholesale scale will commence and demoralize the whole apiary.

Should such a thing occur, every hive must be closed at once, and those colonies being robbed must have their entrances contracted to enable only one bee at a time to enter. Grass is a good thing to cover the entrances with, and if water is poured over this it will prove a fairly effective barrier for the robbers. The colonies should not then be manipulated further for the remainder of that day. A bad case of autumn robbing is, next to disease, the worst calamity a beekeeper has to fear.

BEE-ESCAPES.

For the removal of honey, particularly in the autumn, the bee-escape board fitted with two Porter bee-escapes is very handy. These escapes enable the honey to be removed without causing any disturbance. More especially will the boards be found of service in removing supers of section honey from the hives. There is far more risk in removing this class of surplus than with ordinary extracting combs. When the colony is disturbed the bees will at once start to fill their sacs, and often the cappings of the sections are punctured in order to secure a supply of honey. This damage to the cappings of sections is unsightly, and will cause the combs to leak after removal.

The escapes are fitted to a board the exact size of the hive in use, and two should be fitted to each board; thus if one should become blocked the bees may still escape through the other. In placing, gently prize up the super to be removed, and slide the board into position from the back. A puff of smoke will be sufficient to control the bees during this operation. If this is done late in the afternoon the bees will pass through the escape during the night and will be unable to return. In the morning the supers may be removed, few bees being found in them. These escape-boards are of singular use when queen-excluders have previously been placed on the hives, and instances of their inefficiency can always be traced to brood being present in the supers. The bees will not leave the brood to go below, and when excluders have not been adopted a cursory examination for brood should be made before placing the board.

WEAK COLONIES AND PREPARATIONS FOR WINTER.

During the last removal of honey from the colonies attention should be given to their general condition for wintering. As far as possible weak colonies should not go into winter quarters unless headed by a good queen. During warm days their stocks rarely escape the attention of robber bees, and they are often so severely molested as to become extinct. It is frequently the presence of weak colonies in the apiary that starts autumn and winter robbing, and it is by far the best plan to unite these with stronger colonies in the apiary, and so avoid the risk of creating a disturbance among the bees when normal winter conditions should prevail.

A very good plan to follow when uniting is to put the weak colony on the top of a strong one, placing a sheet of newspaper, previously punctured two or three times with a pencil, between the two hive-bodies. In the course of a few days the paper will have been eaten through and the bees peaceably united. The surplus combs and super may subsequently be removed and the colony prepared for winter. If weather conditions permit it is advantageous, but not essential, to destroy the queen in the weaker hive before uniting.

The season's honey crop depends largely on the steps taken in the previous autumn. Colonies permitted to go into winter quarters either short of stores, with a poor or failing queen, or in a very weak or diseased condition, will invariably be a disappointment the following spring. These important matters should be

settled now, and the beekeeper should then satisfy himself that his hives are water-tight and draught-proof, thus ensuring a snug winter. As previously advised, leave between 30 lb. and 40 lb. of honey for winter consumption. It is better to have too much than too little. If the colonies are well sheltered from the prevailing cold winds the stores will not be consumed so rapidly, hence it pays to provide as much shelter as possible.

THE GARDEN.

W. H. TAYLOR, Horticulturist.

VEGETABLE-CULTURE.

In southern and middle districts planting for winter crops should have been finished before this time, but in the warmer districts later planting is possible and often advisable. In Hawke's Bay I have planted celery, cabbages, and savoys during the last half of February and secured good results. Brussels sprouts and broccoli planted at the same time were not a success, however. Where it is not possible to plant these at least a month earlier they are best left out. Brussels sprouts are the best of all winter vegetables, but they are difficult plants to grow in a hot and dry climate. Soil that is rather heavy, and a medium climate, suit them best.

With regard to broccoli—plants that require a long season of growth—I doubt if it is worth while attempting to grow them in hot climates. They must be planted early, and the months of hot, dry weather are very trying to them, while if the cabbage-moth attacks them their case is wellnigh hopeless. In the warmer districts cauliflowers can be grown in a short time, and may well supplant the broccoli. Early varieties of cauliflowers, such as Snowball and Early Paris, may be sown near the end of March, and again near the end of April. The first heads will be ready before September is past, while the succession from these sowings will last till the end of November or a little later. At the time the first sowing of an early variety is made—near the end of March—seed of a giant kind should also be sown. The produce of this sowing will carry the supply on to the end of the year.

The broccoli is a more robust and much hardier plant than the cauliflower. Its greatest value is found in cold countries, or in parts of a semi-tropical country where frost and snow are experienced in winter. The broccoli will bear without injury degrees of cold that would kill the cauliflower. It produces heads during the short days of winter, which the cauliflower cannot do. So far as I know, cauliflowers cannot be produced in any part of New Zealand during the period between mid-June and mid-September, but can in the warmer districts be got at any other time. The period mentioned is that during which broccoli would be valuable, but to get broccoli at that time necessitates planting in November and December—at least, such is my experience. If this cannot be done I can see no use in growing them at all, because, as shown above, cauliflowers can be got during the later periods in a much shorter time and with smaller risk of failure.

Onions should by now have almost completed their growth, and no more watering should be done nor any more fertilizers given. If the tops are still green and growing, watering, or the application of any kind of fertilizer, would cause them to continue a growth that is already too late. Keep the soil clean by surface working; the heat reflected from clean soil assists ripening. The drier the weather and soil the better are these conditions for the bulbs. If it is considered advisable to bend the tops down to assist the ripening process this must be carefully done. The tops may be bent, but must not be broken; if they are, new tops will push up through the break and the bulb be ruined.

A good breadth of turnips should be sown during March—the early part of the month in most places, and the latter end in warm districts. This lot will stand through winter. I advise sowing two sorts—a white, such as Snowball, for first use, and a yellow-fleshed sort for later use. Swedes should be ready for thinning. Attend to this as early as possible, thinning to about 8 in. apart.

In the warmer districts another sowing of French beans may be made, but it should be done at once. Spinach and silver-beet were mentioned in last month's notes. If not already done, sow at once. Winter rhubarb will benefit by a mulch of stable manure or a good dressing of poultry-manure. This is a plant that will

bear any amount of natural manure, though it is easily injured by an overdose of artificial fertilizer. As soon as growth becomes free, stalks may be pulled for use. The clumps should not be pulled bare; always leave a few leaves on each clump.

The Cabbage-moth (Plutella cruciferarum).

The larvæ of this moth are among the most troublesome pests the gardener has to contend with. In a dry summer, and where irrigation is impracticable, I believe there is no way to conquer them. They are essentially dry-weather insects, never being present in great number during an extra wet summer. If planting is done in the midst of a dry season where the moth is prevalent the young plants never get away. Spraying is useless without abundant irrigation, for the grubs first attack the young leaves in the centre of the plants and so prevent further growth. The moths breed so rapidly that attacks are constantly repeated. If conditions of drought are not extreme it is possible to save the crops, but frequent attention is necessary.

Black Leaf 40, 1 pint in 100 gallons of water, is an effectual poison spray. When spraying, particular attention must be paid to the under-side of the leaves. The moth deposits its eggs on the upper surface, but as soon as these hatch out the caterpillars remove to the under-side or to the heart of the plant. When growing conditions are fairly good this spray should save the plants. Quassia is another good remedy. To make a solution allow a handful of quassia-chips for each 8 gallons of water. To prepare, boil the chips for at least half an hour in a smaller quantity of water, strain the liquid into a barrel, add more water to the chips, and strain that also into the barrel. Add 1 lb. of soft soap, previously dissolved in hot water, to each 25 gallons, then fill up with the necessary quantity of cold water. This is a poison spray; it is deadly to all small insects, will not injure animals, and is a tonic to human beings.

All insects have a strong dislike to tar, and this has been used to prevent the moths depositing their eggs on cabbages, &c. The smell of the tar is obnoxious to insects, and further serves to overpower the natural aroma of the cabbage tribe. The object sought can be accomplished if sufficient of the solution is used, as I myself have proved. The method is as follows: In 2 gallons of boiling water place ½ lb. of quite fresh coal-tar; stir till all the tar is dissolved, and make up to 25 gallons by adding cold water. The plants and surrounding soil should be wetted with the solution, the application being repeated after rain. It should be noted that old tar will not dissolve perfectly, while if free tar is left in the solution it will kill the plants by burning. The water must boil before the tar is added; if placed in cold water the tar will adhere to the bottom of the vessel, and some of it will be left after boiling. With regard to strength, 50 gallons is usually the measure advised for ½ lb. of tar, but I consider this solution to be too weak.

Conditions that favour the moth are adverse to growth, which must be encouraged as much as possible. Apply water where possible, and in any case give a little quick-acting fertilizer such as nitrate of soda. Presuming the soil to be properly furnished with fertilizers or manure, nitrate of soda will push the plants into growth if it is at all possible. The nitrate may be given in liquid form, ½ oz. to each gallon of water, and applied close around the plants. Two or three applications may be given four or five weeks apart.

Common salt (sodium chloride) when applied to the soil has some effect on the texture, and probably increases the capacity of the soil to retain moisture. The chemical action of salt on the soil, however, is of greater importance. It makes potash, which is held in the soil in certain insoluble compounds, available by its action upon these compounds. Where phosphates are applied to the soil the presence of salt in the soil solution increases its solvent action, thereby making phosphates more readily available. Salt must not be used in large quantities, because if directly applied to crops it will kill them. It is recommended for mangolds, and is sometimes used as a top-dressing for pasture, and occasionally with cereals, particularly on light soils. For mangolds use 2 to 5 cwt. per acre, and apply a few days before sowing the seed and manure. On pasture land about 3 cwt. of salt is the usual dressing, but kainit, which contains common salt as well as potash, is considered a better dressing.—*Agricultural Instruction Branch.*

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith. Letters should be addressed to the Editor.

GROWING ARTICHOKES FOR PIGS.

F. J. REYNOLDS, Thornton, Bay of Plenty :—

I intend growing artichokes for my pigs, and would like your advice as to the area required for, say, about twenty sows and eighty small weaners. I should also like to know where the seeds or plants may be procured, the cultivation required, the time and distance apart to plant, and when the crop would be ready to stock.

The Agricultural Instruction Branch :—

When artichokes have been once established they are difficult to eradicate. It would be wise, therefore, to reserve a permanent paddock for the crop. Odd corners or waste places, if suitable, are advisable for artichokes. Soil and other conditions favourable for potatoes will do for artichokes. Plough the land deeply about May or June, and replough and lime in August, cultivating the surface in order to destroy weed-growth during the intervening time. Open up furrows 3 ft. apart and drop in the tubers, leaving a space of 2 ft. between the sets. If the sets are small, plant them whole; if large, they may be cut. To cover, turn a furrow over the sets. 4 cwt. will plant 1 acre. The following manure mixture should be sown with the seed: Superphosphate, 2 cwt.; blood and bone, 1 cwt.; sulphate of potash, ½ cwt. The crop matures in about five months. Cultivation to keep the surface loose and free from weeds is very necessary. Harrows can be run over the ground until the plants are about 4 in. high, then intercultivation between the rows is beneficial. When the crop flowers and the tops droop and die the pigs can be put on the standing crop, when they will root up the tubers. If it is decided to keep the paddock going take the pigs off before all the tubers are eaten out. An area of 1½ to 2 acres (the artichokes being fed with other fodder) will be ample. Artichokes are recommended for pregnant sows and for sows that have lost condition after suckling young pigs. They are also good for young pigs. Auckland seed-merchants supply the tubers at from 12s. 6d. to 15s. per hundredweight in season. You would be well advised to place your order early—say, about March—as the supply of seed in large quantities is usually not equal to the demand. As the tubers, if not fully matured, soon rot if stored, you should get the seed only just before planting.

FARM BUTTER FOR WINTER USE.

MRS. J. CLARKE, Te Araroa :—

Will you please advise me how to preserve butter for winter use, stating the amount of salt used; also if boric acid should be added, and, if so, the quantity per pound ?

The Dairy Division :—

The cream from which butter is made should be churned at as low a temperature as is possible under normal conditions, and at a stage when there is only a slight trace of acidity in the cream. The churn should be stopped when the butter is in the granular form, the buttermilk withdrawn, and cold water added to the churn equal in quantity—or a little more—to the buttermilk. The churn should then be given several revolutions, and, if necessary, the addition of water repeated until all trace of buttermilk has been removed. After the wash-water has drained well away the butter should be worked and salted at the rate of about 1 oz. to 1¼ oz. of salt per pound of butter, to this salt being added about ½ oz. of powdered boracic acid. If the product be then packed in an airtight

package and held in a cool place it should keep for a considerable time, provided every care has been taken with regard to the cleanliness of the milk and cream.

LAMENESS IN CATTLE DUE TO SOIL-DEFICIENCY.

S. J. V., Kaiaua :—

I have six heifers which came in with their first calves this spring. All looked perfectly healthy before calving and for some time after, but they have since become lame and have great difficulty in moving about. The lameness appears to be caused by stiffness in the joints, and as movement is painful the animals have fallen off in condition. The older cows and the calves of the heifers are doing well. Could you let me know the cause and a cure for this trouble ?

The Live-stock Division :—

This complaint is due to a deficiency in the soil of the ingredients which are essential to the proper maintenance of the animal-body. It is generally seen in light lands which are poor in phosphates and lime. It is essential that these ingredients be added by top-dressing, otherwise similar conditions may arise in future. A couple of tablespoonfuls of Parrish's food given daily in a bran mash will alleviate the symptoms. This, however, is only treating symptoms, and the complaint is liable to appear again if the land is not treated. The complaint is most severe in any animal with a heavy drain on the system, such as the heifers mentioned in your letter. These, in addition to producing milk, are also making bone and other tissues, not having reached their full growth. Older animals, under the same conditions, may not become affected, or, if so, in less severe form.

INSECT PESTS ATTACKING PASSION-FRUIT VINES.

F. Anderson, Mahurangi :—

I enclose specimens of insects which are present in great numbers on my passion-fruit vines, causing great destruction. I have sprayed with arsenate of lead (two teaspoonfuls to a kerosene-tinful of water) without beneficial results. Will you kindly advise treatment ?

The Horticulture Division :—

The specimens received are two species of a family of insects commonly designated as "plant-bugs," and one small moth. Both larvæ and adult bugs eat leaves, as also do the larvæ of the moth. It requires a very strong solution of arsenate of lead to kill the bugs. Less than 1 oz. per gallon of water is not likely to be effectual, and at that strength it would probably injure the vines. The best treatment is to spray with a quassia solution, which will kill the larvæ, and supplement the spray by shaking off adults that escape on to a sheet of canvas, then throwing them into a vessel containing water, with a little kerosene floating on the surface. Boil ½ lb. of quassia-chips in 3 or 4 gallons of water for half an hour, and make up to 10 gallons with added water. Dissolve 4 oz. of soft-soap in hot water and add it to the solution. This has proved very effectual. The spray must be repeated every week or ten days while the insects are troublesome. Quassia is a poison to insects, but a tonic to human beings ; it is also very bitter, and makes the foliage obnoxious to insects.

BREAKING-IN FERN LAND IN THE NORTH.

Chas. F. Laxton, Kauri, Whangarei :—

I have a hillside consisting of about 20 acres of high fern, with here and there a little small manuka mixed with the fern. Would it be advisable to burn the fern as it stands and grow paspalum on the ashes, and would this grass then prevent the fern from growing again ? What would be the best time of the year to burn ?

The Agricultural Instruction Branch :—

If the hillside is ploughable you should burn the fern and plough up the area and prepare the surface soil so as to have it in condition for sowing about March or April. The following seed mixture per acre is recommended : Paspalum, 6 lb. ;

Danthonia pilosa, 3 lb.; Waipu brown-top, 2 lb.; Italian rye-grass, 6 lb.; cow-grass, 4 lb.; white clover, 2 lb. If the area is stocked heavily in the spring-time, when the fern is coming through the curl stage, sheep and cattle will eat it readily and also keep it down by crushing. If the area is not ploughable, burn towards the end of February or March and sow the same mixture on the ashes. In regard to stocking, the same treatment should also be followed.

TREATMENT FOR RINGWORM IN YOUNG CATTLE.

"INQUIRER," Bankside:—

Will you kindly advise me as to a simple cure for ringworm in young cattle?

The Live-stock Division:—

Any of the following treatments may be adopted; the mode of application must be thorough, and the substance used well worked into the parts of the skin affected, especially around the edges of the parts devoid of hair: (1.) Biniodide-of-mercury ointment—One part of biniodide to sixteen of vaseline. In using this ointment special care must be taken when the skin is extensively affected. When a large surface of the skin is covered with the ointment mercurial poisoning may supervene. (2.) Sulphur ointment—One part flowers of sulphur to four parts vaseline. This can be rubbed into the parts of the skin affected without causing any poisoning. (3.) Formalin treatment—The affected parts may be painted with formalin. A small hair paintbrush is used, and the affected part well soaked with formalin. Formalin is very effective, one well-applied application usually being sufficient.

LOMBARDY POPLAR AND ELAEAGNUS BREAKWIND.

"SUBSCRIBER," Malvern:—

I would be glad of information on the following points in regard to the growing of Lombardy poplar with *Elaeagnus japonica* as a breakwind: Would such a breakwind be suitable on the Canterbury Plains in a very exposed position at an altitude of 700 ft.? The land is stony, with about 6 in. of good soil between boulders, and with a shingly subsoil. The rainfall is 30 in. Planting would be done in belts up to half a mile in length. Would it be suitable under similar conditions to the above but on good wheat-growing soil about 12 in. deep? If the elaeagnus were protected from stock for a few years, could it afterwards be thrown open to afford shade from the sun? This would probably entail maintaining a wire fence on the exposed side of the breakwind. Would poplar cuttings or small trees be best suited for the class of land described? Where can elaeagnus be obtained in large enough quantities in the South Island? I take it that the poplars might be got in next winter, and the elaeagnus grown from cuttings and planted a year or two later.

The Horticulture Division:—

It has to be admitted that poplars do not do well in some situations. In some places where spring winds are frequent and strong the young growths are damaged and progress is slow. Our experience of such occurrences is, however, in places where the wind is charged with salt from the sea; farther inland this spring damage would not be likely to occur, but it would be wise to ascertain how the tree succeeds under similar conditions before undertaking large plantings. Rooted plants would be best for stony soil. For good soil cuttings are as good as rooted plants. Elaeagnus could be planted a year after the poplars. When the elaeagnus has grown above the reach of sheep these animals could be allowed access to them. Nurserymen usually stock quantities of elaeagnus, as it is a commonly used hedge-plant. If large numbers are required it might be necessary to order a year in advance.

The Ashburton Agricultural and Pastoral Association is now issuing a magazine edited by its educational committee, whom we have to thank for a copy of the second number.

LAND HOLDINGS IN NEW ZEALAND.

TABLE SHOWING FOR THE YEAR 1920–21 THE NUMBER OF OCCUPIED HOLDINGS (OUTSIDE BOROUGH BOUNDARIES) IN GROUPS OF SIZES ACCORDING TO LAND DISTRICTS, ALSO CORRESPONDING ACREAGES FOR THE DOMINION.

Areas of Holdings (Acres, inclusive).	North Auckland.	Auckland.	Hawke's Bay.	Taranaki.	Wellington.	Nelson.	Marlborough.	Westland.	Canterbury.	Otago.	Southland.	Total Numbers for the Dominion.	Total Acreages for the Dominion.
													Acres.
1–5 ..	1,786	833	975	458	1,715	402	345	131	2,458	1,014	453	10,570	31,085
6–10 ..	1,020	392	606	234	714	243	125	73	1,021	506	242	5,176	42,367
11–15 ..	564	199	296	133	348	193	66	42	474	294	178	2,787	36,368
16–20 ..	474	168	196	79	266	182	44	29	517	239	151	2,345	43,383
21–30 ..	694	277	251	131	403	260	72	66	601	301	173	3,229	83,352
31–40 ..	536	234	234	93	341	147	37	46	387	229	147	2,431	88,032
41–50 ..	554	481	191	222	363	160	53	54	436	227	129	2,870	134,911
51–75 ..	950	801	327	531	663	211	81	80	664	413	241	4,962	311,111
76–100 ..	1,009	1,219	337	699	733	228	74	91	635	395	326	5,746	519,377
101–150 ..	1,247	1,545	420	1,074	961	314	104	112	876	632	490	7,775	968,906
151–200 ..	873	1,210	252	783	714	193	88	143	715	481	574	6,026	1,072,506
201–250 ..	594	709	161	444	524	134	68	91	582	387	464	4,158	934,019
251–320 ..	668	768	174	373	490	180	80	120	700	435	572	4,560	1,304,577
321–400 ..	571	632	192	221	427	147	85	89	577	367	413	3,721	1,346,016
401–500 ..	469	531	235	192	399	175	72	88	503	344	359	3,367	1,520,312
501–640 ..	372	499	285	216	471	188	101	54	488	319	294	3,287	1,868,206
641–750 ..	184	223	149	100	240	95	57	40	215	153	126	1,582	1,097,393
751–1,000	248	403	293	188	381	190	91	38	364	242	166	2,604	2,278,828
1,001–2,000	329	507	550	217	666	224	167	54	524	368	215	3,821	5,306,575
2,001–3,000	72	113	211	47	202	32	47	9	176	135	40	1,084	2,677,873
3,001–4,000	33	45	111	13	99	14	39	5	97	83	37	576	2,003,392
4,001–5,000	16	17	73	8	38	6	10	9	47	69	19	312	1,444,645
5,001–7,500	11	24	78	11	58	7	28	16	42	74	21	370	2,262,723
7,501–10,000	5	23	26	3	17	..	14	10	31	41	11	181	1,564,258
10,001–15,000	8	12	22	..	22	1	12	12	30	63	16	198	2,431,219
15,001–20,000	..	5	13	..	8	..	13	8	26	36	6	115	1,993,154
20,001–30,000	1	4	6	..	2	2	7	13	20	22	10	87	2,164,650
30,001–40,000	1	3	3	..	2	..	1	7	16	19	5	57	1,980,408
40,001–50,000	2	..	1	..	..	..	1	3	5	7	..	19	846,502
Over 50,000 ..	..	1	3	..	1	1	7	2	20	19	6	60	5,190,609
Totals, 1920–21	13,291	11,878	6,671	6,470	11,268	3,929	1,989	1,535	13,247	7,914	5,884	84,076	43,546,757
Totals, 1919–20	13,009	11,261	6,345	6,288	10,928	3,914	1,970	1,471	12,887	7,786	5,733	81,592	43,473,079

IMPORTATION OF NEW-ZEALAND-GROWN POTATOES INTO CANADA.

SOME time ago a shipment of potatoes from New Zealand to Vancouver was refused entry on the grounds that potatoes infested with tuber-moth are strictly prohibited from entering the Dominion of Canada. In reporting the circumstances of the case to the Department of Agriculture the Canadian authorities intimated that they did not wish to place an embargo against New Zealand potatoes, as they were anxious to do everything possible to foster Empire trade, but that it was necessary that they should have a guarantee that New Zealand potatoes intended for Canada are not infested with this pest.

In answer to an inquiry as to the precautions that they considered should be taken to guarantee freedom the Canadian authorities offered the following suggestions: (1) That precautions should be taken to see that no tuber-moth exists in the districts where the potatoes are grown; (2) that before being shipped they should not be allowed to come in contact with any potatoes known to be infested with the tuber-moth; (3) that they should not be stored in any warehouse or wharves where infested potatoes have been; and (4) that they should be shipped in new bags.

Potato tuber-moth (*Lita Solanella*) is fairly common each season in the North Island, but in some seasons is absent, or almost so, in most parts of the South Island. Hence any merchant contemplating the shipment of potatoes to the Dominion of Canada should take special steps to first satisfy himself that the area from which the potatoes are to be drawn is free from potato-moth. To this end the Department of Agriculture will be pleased to assist with advice upon application being made to it.

THE FORESTRY LEAGUE AND ITS JOURNAL.

THE progress of the forestry movement in the Dominion is well evidenced by the appearance this month of a new quarterly publication, *The Forest Magazine of New Zealand*, as the official journal of the New Zealand Forestry League. The new paper is a well-produced, illustrated publication, edited by the League's organizer, Mr. Will Lawson, and the first number makes an excellent start as regards usefulness, interest, and brightness of contents. Supply of the magazine is obtained by membership of the Forestry League.

The aims of the League (whose address is P.O. Box 783, Wellington) may be here quoted as follows: (1) To promote the interests of forestry in New Zealand; (2) to give moral support and encouragement to the recently instituted national forest policy; (3) to aid in conserving native bush for scenic reserves, water-conservation, and other purposes; (4) to promote and assist in the demarcation and reasoned use of New Zealand's forest heritage; (5) to encourage the planting of trees by public and local bodies as well as by private individuals; (6) to advise as to what trees are most suitable for planting in different districts; (7) to advise as to the methods which should be adopted in planting; (8) to assist in and encourage the correct naming of trees; (9) to assist in procuring trees for those wishing to plant; (10) to collect reliable data as to the results of planting; (11) to obtain and disseminate information as to the commercial value of exotic trees which have been found most suitable for growing in the various districts.

Curing of Sheep and Calf Skins.—First trim all ragged edges and remove as much flesh, fat, &c., as possible without damaging the skin. Next place the skin on a floor or other flat surface, wash the wool or hair with warm water and soap, and then clear by squeezing or scraping with a smooth board. Then shake the skin well, place it on a clean surface with the fleshy side upwards, and, taking a good handful of alum to which a little salt has been added, proceed to rub this well in with a rotary motion over all the surface equally. Next fold up the skin with the wool or hair outward and let it lie for three days. Then open and hang the skin for a while, and commence to scrape it with a furrier's knife, always scraping in the same direction; three scrapings are required to properly finish the skin. Discretion must be used in treating strong- or weak-fibred skins.

IMPORTATION OF FERTILIZERS: DECEMBER QUARTER.

Following are the importations of fertilizers into New Zealand for the quarter ended 31st December, 1921, the name, quantity, and declared value of each kind, together with country of departure, being specified :—

Sulphate of Ammonia.—Australia, 10 tons, £143.
Gypsum.—Australia, 50 tons, £74.
Nitrate of Soda.—Australia, 59 tons, £1,200.
Basic Slag.—Belgium, 50 tons, £279.
Bonedust.—India, 1,060 tons, £8,703; Australia, 1,036 tons, £13,474: total 2,096 tons, £22,177.
Char Dust and Bone Char.—Australia, 301 tons, £2,021.
Guano.—United Kingdom, 10 tons, £143; New Caledonia, 1,655 tons, £2,788: total, 1,665 tons, £2,931.
Rock Phosphate.—Australia, 250 tons, £963; Nauru, 12,593 tons, £27,705: total, 12,843 tons, £28,668.
Superphosphate.—Australia, 25 tons, £151.
Kainit.—Belgium, 60 tons, £178; Germany, 446 tons, £1,565: total, 506 tons, £1,743.
Muriate of Potash.—Germany, 30 tons, £384.
Sulphate of Potash.—Belgium, 85 tons, £1,328; Germany, 45 tons, £773: total, 130 tons, £2,101.
Potash, other.—India, 10 tons, £345; France, 40 tons, £269: total, 50 tons, £614.
Sulphate of Iron.—Australia, 25 tons, £277.
Other Fertilizers.—Australia, £12.

Note.—With regard to the "declared values" which are given above, the Comptroller of Customs gives the following explanation: "The value for duty is defined as the fair market value in the country whence the goods are imported plus 10 per cent. As the addition of 10 per cent. does not cover the present freight, insurance, and other charges, the statistical value is less than the actual landed value."

BRITISH DAIRY-FARMERS' ASSOCIATION'S SHOW, 1921.

The forty-third annual dairy show of this association was held in London on 18th to 21st October last, and, as in former years, included competitive and exhibition sections for colonial dairy-produce. The High Commissioner reports that of the colonial butters exhibited only two boxes were of New Zealand manufacture, whereas Australia, South Africa, and Canada were well represented. Australian exhibits secured first prizes in both the salted (99 points) and the unsalted (98 points) sections, although one exhibit scored as low as 78 points. The points scored by the South African butters ranged from 64 to 95, and the Canadian from 72 to 96 points. The exhibits of New Zealand butter were from the Golden Bay Dairy Company, Takaka, and the Midhirst Co-operative Dairy Company, Midhirst, and scored 95 and 94 points respectivcly. These exhibits were shipped especially for the purpose of the show. There was no New Zealand cheese on exhibition, although Australian, South African, and Canadian products were in evidence. In the colonial honey section one exhibit of New Zealand white honey gained first prize in competition with three of Queensland honey. The South African Government had on exhibition a large and impressive display of butter, cheese, bacon and hams, and eggs, while the State of Ontario exhibited dairy and agricultural produce and both chilled and fresh apples, but these were the only exhibits made by colonial Governments.

Cows not coming into Season.—The commonest causes of such a condition are: (1) Low condition and general ill health—long-standing diseases of internal organs; (2) the opposite state, with resultant fatty degeneration of the ovaries and fallopian tubes; (3) in old cows, closure of the mouth of the uterus due to injuries at previous calvings.—*Live-stock Division.*

PRICES AND DISPOSAL OF 1921-22 WHEAT CROP.

An announcement was made in March last year by the Minister of Agriculture that prices would be guaranteed for the 1921–22 wheat crop, and that these prices would be not less than 5s. 6d., 5s. 9d., and 6s. 3d. per bushel for Tuscan, Hunters, and Pearl respectively, the actual prices being left to be fixed during the present month, having regard to the world's market price at that date. It has now been decided that the minimum prices above referred to shall be the actual prices at which wheat will be purchased by the Government, these prices to have reference to the whole of the milling-wheat produced during the season 1921–22. These prices are on the basis of f.o.b., southern ports, and the deductions will be the same as in previous years. The Wheat Controller has been instructed accordingly.

It was decided that the surplus of good milling-wheat be exported, and arrangements to give effect to this decision have now been completed. An export agent to represent the Government has been appointed, the tender of Messrs. A. S. Paterson and Co., Ltd., being accepted.

A decision has been arrived at also with respect to wheat of under-milling quality (fowl-wheat), which, when sold by the grower, must not exceed 2d per bushel less than the equivalent price of Tuscan good milling-wheat. Taking this as a basis, the price for sales by persons other than growers will be calculated in the same way as in the past year; that is to say, brokers will be entitled to 1d. per bushel in excess of the growers' price with the addition of cost of transit, while the retail price may allow a margin of not more than 15 per cent. on the broker s price, together with the addition of actual cost of transportation.

ESTIMATED YIELDS OF WHEAT AND OAT CROPS.

The following estimated average yields per acre of wheat and oats for the season 1921–22 have been compiled by the Government Statistician from reports furnished by Inspectors of the Department of Agriculture throughout the Dominion, and issued under date 14th February :—

District.	Wheat. Bushels per Acre.	Oats. Bushels per Acre.
North Island	32·61	37·77
Nelson	22·97	24·00
Marlborough	34·48	44·66
Canterbury	27·89	37·45
Otago	34·06	44·56
Southland	39·67	48·81
Average (estimated) for the Dominion, season 1921–22	29·32	40·68
Average (actual) for the Dominion, season 1920–21 ..	31·24	35·41

In accordance with the above estimates, the total yield of wheat for the Dominion should be approximately 10,500,000 bushels, as against an actual yield of 6,872,262 bushels for the season 1920–21.

The percentage of oat crop threshed for the five seasons ending with 1920–21 was 31.87 of the total area under that crop. Assuming that a similar proportion is threshed this year, the total yield of grain should be 6,000,000 bushels, as against an actual yield of 5,225,115 bushels for the season 1920–21.

Noxious Weeds.—Recent declarations under the Noxious Weeds Act by local bodies comprise the following: Matamata County—broom and gorse; Hobson County—foxglove and hawthorn.

MEAT-EXPORT CONTROL ACT.

TEXT OF THE POOL MEASURE.

THE Meat-export Control Act passed in the recently closed session of Parliament is here placed on record for *Journal* readers, the full text being as follows :—

AN ACT TO MAKE PROVISION FOR THE APPOINTMENT OF A MEAT PRODUCERS BOARD, WITH POWER TO CONTROL THE MEAT-EXPORT TRADE.

WHEREAS the economic welfare of New Zealand has lately been adversely affected by reason of a reduction in the net returns receivable by persons engaged in the business of the production of meat for export, such reduction being due in part to falling prices and in part to the charges payable in respect of freight and other services : And whereas conferences have lately been held of representatives of the Government and of persons whose business is the production of meat for export, and it has been resolved that the public economic welfare will be promoted by the establishment of a Board of Control, with power to act as the agent of the producers in respect of the preparation, storage, and shipment of meat, and in respect of the disposal of such meat beyond New Zealand : And whereas it is desired to give effect to the resolutions aforesaid, and to provide by law accordingly : And whereas it is further deemed necessary and desirable that the expenditure of the Board of Control should be subject to audit as if it were public expenditure, and that the expenditure of the Board should be guaranteed by the Government of New Zealand :

Be it therefore enacted by the General Assembly of New Zealand in Parliament assembled, and by the authority of the same, as follows :—

1. This Act may be cited as the Meat-export Control Act, 1921–22.

New Zealand Meat Producers Board.

2. (1.) There is hereby established a Board to be known as the New Zealand Meat Producers Board (hereinafter referred to as the Board). (2.) The Board shall consist of—(*a.*) Two persons to be appointed by the Governor-General on the recommendation of the Minister of Agriculture as representatives of the New Zealand Government. (*b.*) Five persons to be appointed by the Governor-General as representatives of the producers of meat for export, on election by such producers in such manner as may be prescribed. (3.) In addition to the members to be appointed pursuant to the last preceding subsection the Governor-General may from time to time appoint a member as a representative of persons for the time being engaged in business as stock and station agents. Every such member shall be appointed for a term of two years, but may at any time be removed from office by the Governor-General on the recommendation of the Board, or may from time to time be reappointed on the expiry of any term of his appointment. (4.) The members appointed as representatives of the Government shall hold office during the pleasure of the Governor-General. (5.) With respect to the first members appointed as representatives of the producers of meat, the following provisions shall apply : (*a.*) Three of such members shall retire on the thirty-first day of August, nineteen hundred and twenty-three, and the remaining two members shall retire on the thirty-first day of August, nineteen hundred and twenty-four. (*b.*) The members so to retire on the thirty-first day of August, nineteen hundred and twenty-three, shall be determined by agreement of the members, and, failing agreement, shall be determined by lot. (*c.*) Any member retiring as aforesaid shall be eligible for reappointment to the Board. (6.) Except as provided in the last preceding subsection, every person appointed as a representative of the producers shall hold office for a period of two years from the date of his appointment, save that he may be reappointed in the manner prescribed by paragraph (*b*) of subsection two hereof, or may at any time be removed from office by the Governor-General on the recommendation of the Board. (7.) On the death, resignation, or removal from office of any member of the Board appointed as a representative of the producers as aforesaid the Governor-General shall, on the recommendation of the Board, appoint some

fit person to be a member of the Board for the residue of the term for which such first-mentioned person was appointed. (8.) The powers hereinafter conferred on the Board shall not be affected by any vacancy in the membership thereof.

3. The Board shall be a body corporate, with perpetual succession and a common seal, and shall be capable of holding real and personal property, and of doing and suffering all that bodies corporate may do and suffer.

4. (1.) In any case in which the Governor-General is satisfied that any member of the Board is incapacitated by illness, absence, or other sufficient cause from performing the duties of his office, the Governor-General, on the recommendation of the Minister of Agriculture, if the member so incapacitated is a Government representative, or on the recommendation of the Board in any other case, may appoint some fit person to be named by the Minister or the Board, as the case may require, to be a deputy to act for that member during such incapacity; and any deputy shall, while he acts as such, have all the powers and authority of the member for whom he is so acting. (2.) No such appointment of a deputy and no acts done by him as such shall in any proceedings be questioned on the ground that the occasion for his appointment had not arisen or had ceased.

5. (1.) The first meeting of the Board shall be held on a day to be appointed in that behalf by the Minister of Agriculture. (2.) At the first meeting the Board shall appoint one of its members to be the Chairman of the Board. (3.) On the second Wednesday in September, nineteen hundred and twenty-three, and on the same day in each succeeding year, the Board shall hold a meeting for the purpose of appointing a Chairman for the ensuing twelve months. (4.) Any person appointed as the Chairman of the Board shall hold office until the appointment of his successor in accordance with this section, and shall be eligible for reappointment.

6. (1.) Except as provided in the last preceding section, meetings of the Board shall be held at such times and places as the Board shall from time to time appoint. (2.) The Chairman of the Board, or any four members thereof, may at any time call a special meeting of the Board. (3.) At all meetings of the Board four members, of whom at least one shall be a representative of the Government, shall form a quorum. (4.) The Chairman shall preside at all meetings of the Board at which he is present. (5.) In the event of the absence of the Chairman from any meeting of the Board the members present at such meeting shall appoint one of their number to be the Chairman of the meeting. (6.) At any meeting of the Board the Chairman shall have a deliberative vote, and in the case of an equality of votes shall also have a casting-vote, and a decision of the majority of the members present shall be the decision of the Board.

7. (1.) The Board may appoint such officers as it deems necessary for the efficient carrying-out of its functions under this Act. (2.) Any person in the service of the Crown may be appointed as an officer of the Board: Provided that no such person shall accept such appointment and be entitled to retain his position as a servant of the Crown except—(*a*) In the case of a person subject to the Public Service Act, 1912, with the consent of the Public Service Commissioner; and (*b*) in any other case with the consent of the Minister to whose control he is subject.

London Agency of Board.

8. (1.) There is hereby also constituted an agency of the Board in London (hereinafter called the London Agency) which shall consist of such number of persons as the Board may decide from time to time, of whom one shall be appointed by the Governor-General on the recommendation of the Minister of Agriculture, and shall hold office during his pleasure. (2.) The other members of the London Agency shall be appointed by the Board, and shall hold office during the pleasure of the Board. (3.) It shall be the duty of the London Agency to keep the Board advised as to current prices of meat and as to other matters relative to the disposal of New Zealand meat in England or elsewhere, and generally to act as the agent of the Board in accordance with the directions of the Board.

Meat not to be exported save in accordance with Determination of Board.

9. (1.) For the purpose of enabling the Board effectively to control the export, sale, and distribution of New Zealand meat the Governor-General may, acting under the powers conferred on him by the Customs Act, 1913, and its amendments,

prohibit the export from New Zealand of any meat save in accordance with the determination in that behalf of the Board. (2.) It may be a condition of a license issued under section twenty-five of the Slaughtering and Inspection Act, 1908, or of a meat-export license issued under the Slaughtering and Inspection Amendment Act, 1918, that the export of meat under the authority of that license shall be subject to such conditions and restrictions as may be imposed by the Board or otherwise pursuant to this Act.

Board may assume Control of Meat intended for Export.

10. (1.) The Board is hereby empowered to determine from time to time the extent to which it is necessary, for the effective operation of this Act and the fulfilment of its purposes, that the Board should exercise control over the export of meat from New Zealand, and may assume control of any such meat accordingly. (2.) In any such case the control of the Board shall operate as from a time to be specified in that behalf by the Board by notice given in conformity with this Act. (3.) Notice by the Board of its intention to assume control of any meat may be given either by service on the owner of any meat or on any person having possession thereof, or by publication in any newspaper or newspapers in accordance with such conditions as may be prescribed. Every such notice shall, subject to the provisions of this Act, have effect according to its tenor. (4.) The control to be exercised by the Board over any meat may, as the Board in any case determines, be absolute or limited. (5.) All meat of which the Board has assumed absolute control shall be graded and shipped as the Board directs, and shall be sold and disposed of only by the Board, or by direction of the Board, at such times and in such manner and on such terms as the Board in its discretion determines. (6.) Where the Board has assumed limited control the extent of its control shall be defined by notice as aforesaid, or by agreement between the Board and the owners of the meat or other persons having authority to enter into an agreement with the Board with respect to such meat. (7.) Notwithstanding anything to the contrary in the foregoing provisions of this section the Board shall not exercise its powers under this section with respect to the sale of any meat if the Board is satisfied—(*a*) That there is subsisting a contract for the purchase and sale of that meat made before the commencement of this Act, or (*b*) that there is subsisting a contract for the purchase and sale of that meat made after the commencement of this Act but before the Board has given notice of its intention to assume control of that meat; and that the meat to which any such contract as aforesaid relates is to be exported from New Zealand not later than the thirty-first day of October, nineteen hundred and twenty-two.

Board may make Arrangements as to Slaughtering of Stock.

11. In addition to the powers conferred on the Board by the last preceding section the Board may, as the agent of the owners of any stock from which the meat or any portion of the meat is intended for export, make such arrangements as may be necessary for the purpose of ensuring the effective operation of this Act or in the interests of producers with respect to the slaughtering of that stock.

As to Contracts for Shipment of Meat.

12. (1.) After the constitution of the Board, or after such later date as the Board may by public notice appoint, no contract for the carriage by sea of any meat to be exported from New Zealand shall be made save by the Board, acting as the agent of the owners of that meat or of other persons having authority to export that meat, or in conformity with conditions to be approved by the Board. (2.) Every contract for the carriage of meat by sea made otherwise than in conformity with this section shall be void. (3.) Every person other than the Board who, after the passing of this Act, or after such later date as aforesaid, exports any meat from New Zealand shall, on making entry therefor under the Customs Acts, and before such entry has been passed, produce to the Collector or other officer of Customs sufficient evidence to satisfy the Collector or other officer as aforesaid that the contract for the shipment of that meat has been approved by the Board. (4.) The foregoing provisions of this section shall apply, with the necessary modifications, to contracts made before the commencement of this Act, save that the approval of the Board shall not be required for any such contract if the meat to which it relates is exported from New Zealand not later than the thirty-first day of October, nineteen hundred and twenty-two.

Levy on Meat exported.

13. (1.) There shall be paid by way of levy on all meat exported from New Zealand after a date to be fixed in that behalf by the Governor-General in Council, whether such meat is subject to the control of the Board or not, such charges as may from time to time be fixed by the Board, not exceeding the maximum charges that may be prescribed in that behalf by regulations under this Act. (2.) All moneys payable under this section in respect of any meat shall be paid to the Collector of Customs on or before the entry of that meat for export, and shall be paid into the Consolidated Fund. (3.) The net amounts paid into the Consolidated Fund as aforesaid, after deducting such proportion as may be prescribed in respect of the services of the Collectors and other officers of Customs, shall from time to time be paid to the Board without further appropriation than this section, and shall form part of the funds of the Board.

Particular Powers of Board.

14. (1.) Without limiting any authority specifically conferred on the Board with respect to any meat, the Board shall have full authority to make such arrangements and give such directions as it thinks proper for the following matters: (*a*) For the grading, handling, pooling, and storage of meat; (*b*) for the shipment of such meat on such terms and in such quantities as it thinks fit; (*c*) for the sale and disposal of meat on such terms as it thinks advisable; (*d*) for the insurance against loss of any such meat either in New Zealand or in transit from New Zealand, and until disposed of; and (*e*) generally for all such matters as are necessary for the due discharge of its functions in handling, distributing, and disposing of New Zealand meat. (2.) For the purpose of securing any advances that may be made to the Board or to the owners of any meat at the request of the Board, the Board shall, by virtue of this Act and without further authority, have full power on behalf of the owners to give security over such meat and to execute all mortgages and other instruments of assurance in the same manner in all respects as if the Board were the legal owners of such meat.

Application by Board of Moneys received by it.

15. All moneys received by the Board in respect of the sale of meat or otherwise howsoever shall be paid by the Board into a separate account at a bank to be approved by the Minister of Finance, and shall be applied by the Board as follows: (*a*) In payment of the expenses, commission, and other charges incurred by the Board or for which the Board may become liable in the course of its business; (*b*) in payment of the salaries and wages of officers and servants of the Board; (*c*) in payment of travelling-allowances, fees, or other remuneration to members of the Board or of the London Agency (not being persons permanently employed in the service of the Government); (*d*) in payment of advances made by the Board to the owners of any meat on account of the price of that meat; (*e*) in payment of interest and other charges, and in repayment of principal, in respect of moneys advanced to the Board by the Minister of Finance; (*f*) in payment into a Reserve Fund, from time to time as the Board in its discretion determines, of such amounts as the Board may consider necessary to enable it to carry on its operations under this Act; (*g*) in payment of the balance to the owners of meat controlled by the Board in proportions to be fixed by the Board by reference to the quantity and grade of the meat handled by the Board in respect of the several producers or other owners of meat.

16. The accounts of the Board shall be subject to audit in the same manner in all respects as if the moneys of the Board were public moneys within the meaning of the Public Revenues Act, 1910.

Minister of Finance may guarantee Advances made to or at Request of Board.

17. (1.) Where any bank or other person carrying on business in New Zealand has, with the approval of and subject to conditions imposed by the Minister of Finance, advanced moneys to the Board on the security of any meat controlled by the Board for the purpose of enabling the Board to make advances to the owners of that meat, or has advanced moneys to such owners at the request of the Board, the Minister of Finance is hereby authorized to guarantee to the bank or other person as aforesaid the repayment of such advances and of the interest and other charges in respect thereof. (2.) In the event of default being made by the Board

or by any other person in the repayment of any such advances, or of the interest or other charges thereon, or of any portion thereof, the Minister of Finance may, without further appropriation than this section, pay out of the Consolidated Fund such amount as may be payable by him pursuant to the terms of the contract of guarantee. (3.) In lieu of or in addition to exercising the authority to guarantee advances as aforesaid, the Minister of Finance may from time to time borrow on the security of Treasury bills, or otherwise on the security of the public revenues of New Zealand, any moneys that may be required by the Board to enable it to carry on its operations under this Act, and may pay the same into the Board's account. (4.) All moneys so advanced to the Board shall be charged on the revenues and other property of the Board, and shall bear interest at such rate as may from time to time be fixed by the Minister of Finance. (5.) The limit imposed on the issue of Treasury bills by section thirty-nine of the Public Revenues Act, 1910, shall not apply to the issue of Treasury bills under this section; but, save as aforesaid, the provisions of that section, including the provisions relating to renewal, shall extend and apply to all such Treasury bills.

Liability of Board for its Acts or Omissions.

18. (1.) The Board in its corporate capacity shall in all its operations under this Act be deemed to be the agent of the owners of all meat of which the Board has assumed control, and the mutual rights, obligations, and liabilities of the Board and the several owners shall accordingly be determined in accordance with the law governing the relations between principals and agents, save that nothing herein shall be construed to limit the power of the Board to exercise, without the authority of the owner of any meat, any power with respect to such meat that may expressly or by implication be conferred on the Board by or by virtue of this Act. (2.) The members of the Board shall not be personally liable for any act or default of the Board done or omitted to be done in good faith in the course of the operations of the Board.

Regulations.

19. For the purpose of enabling the Board to carry out its functions under this Act the Governor-General may make regulations prescribing the maximum charges to be paid by way of levy in respect of meat exported from New Zealand, and all such other regulations as he thinks necessary for the purpose of enabling this Act to be carried into effect.

FORTHCOMING AGRICULTURAL SHOWS.

Rangitikei A. and P. Association: Taihape, 23rd February.
Franklin A. and P. Society: Pukekohe, 24th and 25th February.
Marton District A. and P. Association: Marton, 1st March.
Rotorua A., P., and I. Association: Rotorua, 1st March.
Taranaki A. and P. Association: New Plymouth, 8th and 9th March.
Katikati A. and P. Society: Katikati, 9th March.
Morrinsville A., P., and H. Society: Morrinsville, 15th March.
Ashburton A. and P. Association: Ashburton, 15th and 16th March.
Taumarunui A. and P. Association: Taumarunui, 17th March.
Murchison A. and P. Association: Murchison, 17th March.
Hawke's Bay A. and P. Society: Hastings (Autumn Show), 21st and 22nd March.
Mayfield A. and P. Association: Mayfield, 24th March.
Methven A. and P. Association: Methven, 30th March.
Temuka and Geraldine A. and P. Association: Temuka, 30th March.
Oxford A. and P. Association: Oxford, 6th April.
Mackenzie County A. and P. Association: Fairlie, 17th April.
Manawatu and West Coast A. and P. Association: Palmerston North (National Dairy Show), 20th to 23rd June.

(A. and P. Association secretaries are invited to supply dates and location of their shows.)